

Consulting Engineer

May 1959

GEORGE S. RICHARDSON, Senior Partner of Richardson, Gordon, and Associates, settled in Pittsburgh when he was a young draftsman. He stayed to become one of the nation's leading bridge designers. Today, Richardson can look out the windows of his modern office in the Gateway Center development and recall his design experiences on just about every bridge in sight in the "City of Bridges."

He also can watch

Continued on Page 12



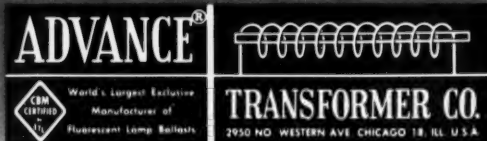
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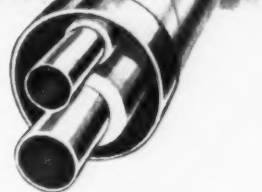
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Wire

21. Simplex takes pleasure in extending an invitation to old friends and new to visit their Booth #1611 at the American Mining Congress Coal Show, Cleveland Public Auditorium, May 11th through May 14th.

22. A 600-passenger ocean liner which will run on hydrofoils is in the design stage.

23. The first rocket-camera has been used to photograph cloud formations over the Atlantic.

24. An electrostatic device can separate particles of different materials. It can sort flour milling stocks, separate grains of different minerals and distinguish between healthy and unhealthy seeds.

25. A new magnetic recording tape has a protective lamination over the oxide to prevent wear.

26. A solid electrolyte battery has been developed that is said to be suitable for commercial production.

27. There are now three large offices where individual desk telephones can be reached from the outside by direct dialing.

28. Mercury batteries reduce the weight of a clock radio, made especially for travelers, to less than three pounds.

29. Stereophonic radio has hitherto required both AM and FM for transmission. A new method uses AM only.

30. The light from a recently patented underwater flash bulb is of such brief duration that fish are not frightened by it.

31. Crevasses in glaciers or ice fields can be detected by a device that can be carried in an airplane. It measures the difference in heat radiation between solid and hollow ice and records on film.

32. Tissues, skin, veins, arteries and circulating blood are all realistically simulated in an imitation human body designed for first aid training.

33. A heating element for use in floors or walls is made of paper in which copper strips are embedded.

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

34. A patent for an acoustical method of stimulating the flow of oil wells has been issued. The sound waves will actually shatter rock.

35. For the first time, an airplane has been guided over land by a missile system using radar to scan a photograph of the terrain.

36. An attachment for a telephone intended for use by a number of people kills germs with ultraviolet light.

37. Electroluminescent panels that emit cool light from a flat glass plate are now made in six colors.

38. Entirely new principles of heating and cooling are used in a unit that keeps foods hot or cold. It is mounted on wheels, uses batteries for power and can be rolled anywhere in or out of the house.

39. Ticker tape is being projected on a screen with letters and figures two feet high at the New York Stock Exchange.

40. A method of bouncing short waves off man-made reflectors in the sky has been patented. It can be used for radio or television.

41. America's annual bill for corrosion is 6 billion dollars, according to recently revised figures. Simplex Wire & Cable Co. has prepared a bulletin on this expensive problem and the most effective means of combating it. Write for Bulletin 1033.



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May 1959 • VOLUME XII • NUMBER V

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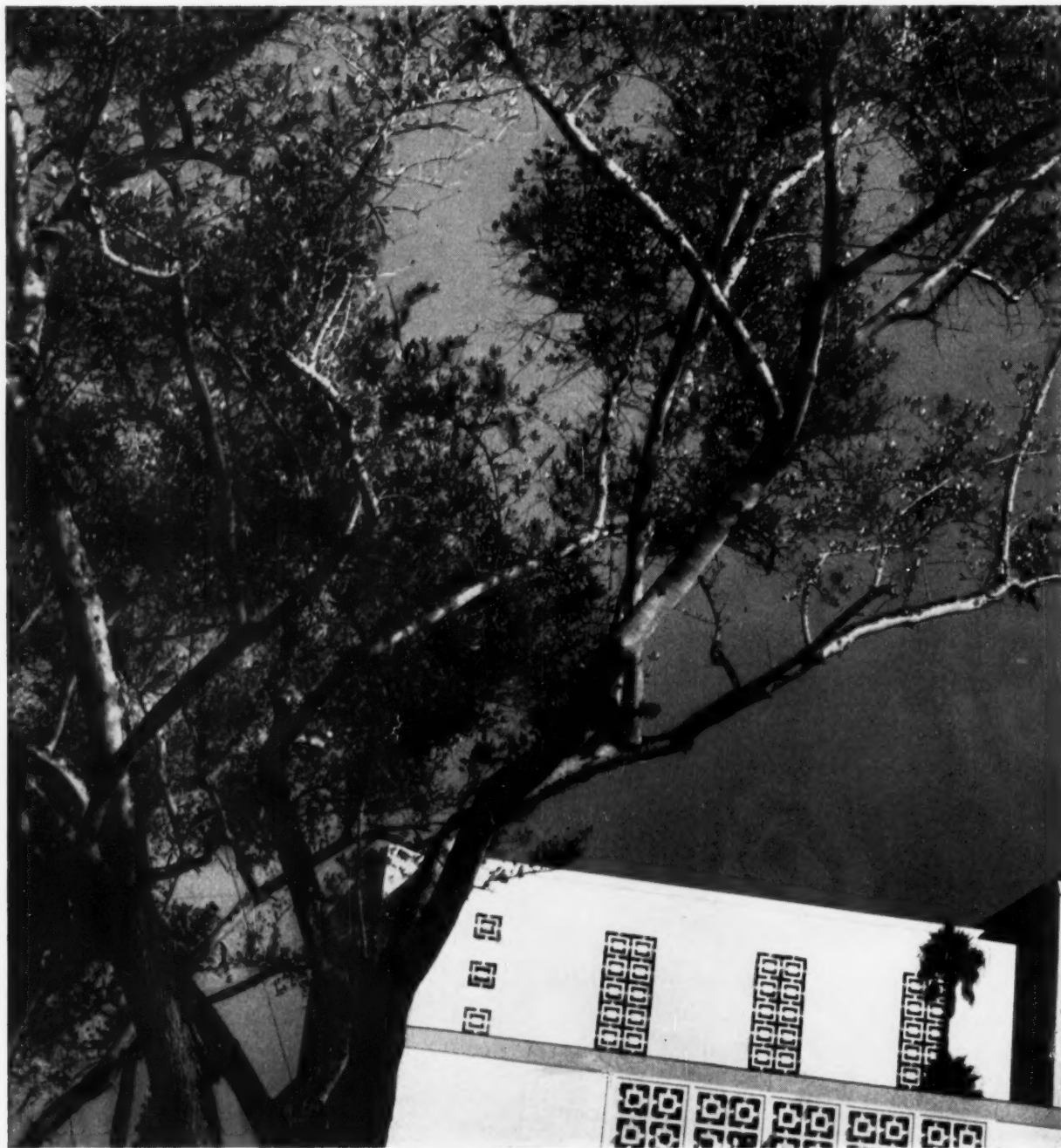
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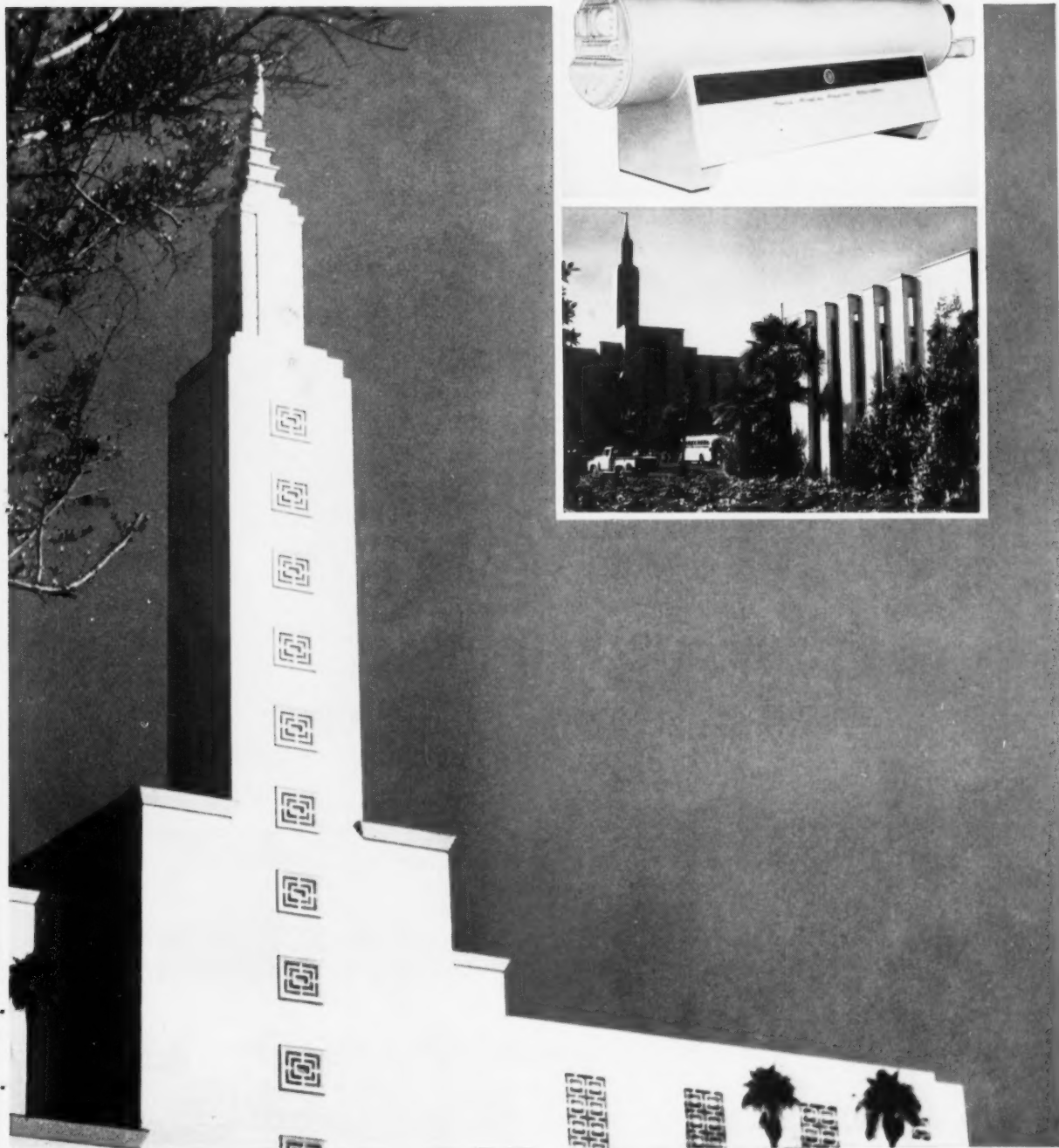
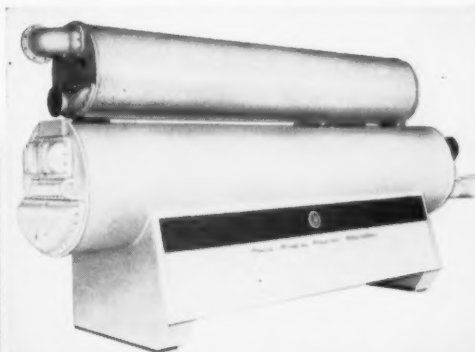


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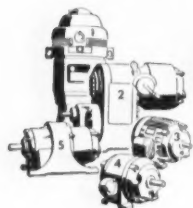
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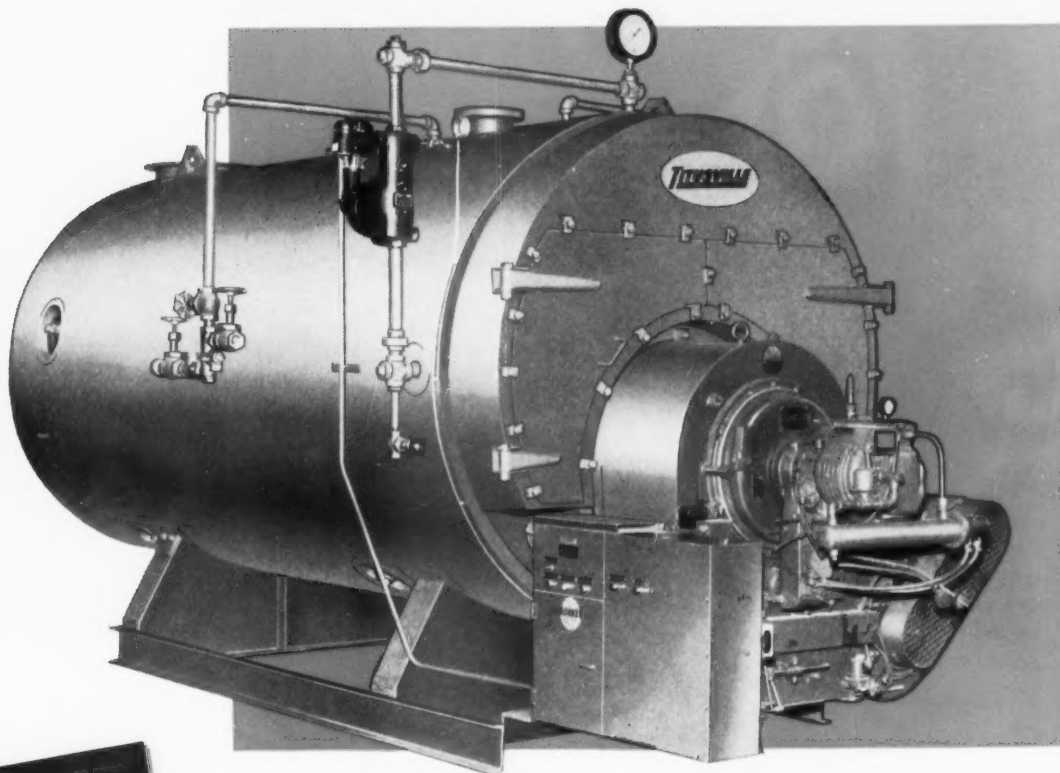
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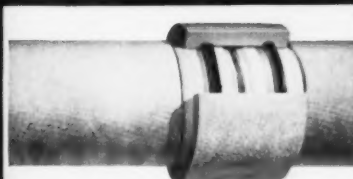
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George S. Richardson

—Starts on front cover

the progress on one of his most important current engineering projects, two new bridges and highway interchanges at the "Point," apex of Pittsburgh's current construction renaissance.

Engineer in a Family of Engineers

The newly elected president of the American Institute of Consulting Engineers, Richardson is an engineer in a family of engineers. When still a boy his father moved from Syracuse to Colorado for his health and later was graduated from the Colorado School of Mines. Richardson was born in Georgetown, Colorado, where his father was an engineer working in the silver mines. With the slump in silver in the nineties, the family moved to a ranch in northwestern Colorado.

Young Richardson attended the University of Colorado, where he received his degree as a civil engineer. "At that time," Richardson explained, "I was very interested in railroad engineering. It was not until I was graduated that I realized railroads were at the end of an era and that the type of engineering that I had in mind for the railroads was definitely on its way out."

This left Richardson with a degree in civil engineering but with no particular specialty in mind.

At the suggestion of his engineering dean, Milo S. Ketchum (father of the Denver consulting engineer), Richardson reversed his father's trek and moved East to Philadelphia where he served for a year as a civil engineering instructor in the Towne Scientific School of the University of Pennsylvania. Even this did not complete the cycle of family movement, for now one of Richardson's sons is back in Denver.

Soon, Richardson went with the Pennsylvania Department of Highways to do surveying and supervision of construction. He resigned from the highway department after a short time, but he found himself in the midst of the depression of 1921, and finding a new job was not easy for a young engineer. He wound up traveling around the East selling filters for electroplating installations.

Decides on Bridge Design Career

It was while he was in Pittsburgh selling filters that he decided things were returning to normal. "I thought I should look around for an engineering job." He became a draftsman with McClintic-Marshall Steel Fabricators, which later was absorbed by Bethlehem Steel. The young draftsman liked the work, and decided that bridge design would be his field of engineering. Later, he became a draftsman with the American Bridge Company,

and gradually he worked from drafting into design.

In 1924, Richardson joined the Allegheny County Department of Public Works, where he moved up from designer to the position of assistant chief engineer. He worked for Allegheny County for the next thirteen years.

"During this period, quite a few of Pittsburgh's major bridges were built," Richardson recalled. Among the projects for which he directed general layout, did preliminary design for the substructures, supervised superstructure design, and prepared contract drawings was the McKees Rocks Bridge over the Ohio River. This bridge is almost a mile long, with two, 300-ft crescent arch spans, four spandrel-braced deck arches, and one 800-ft main span. It cost an estimated \$4,700,000.

It was during this period of bridge development that Richardson met Herschel Allen (immediate past president of the American Institute of Consulting Engineers). Allen was representing the J. E. Greiner Company on a panel of consultants working with Allegheny County on the bridge and highway development program. Since then, Richardson and Allen frequently have worked together on various bridge and highway programs.

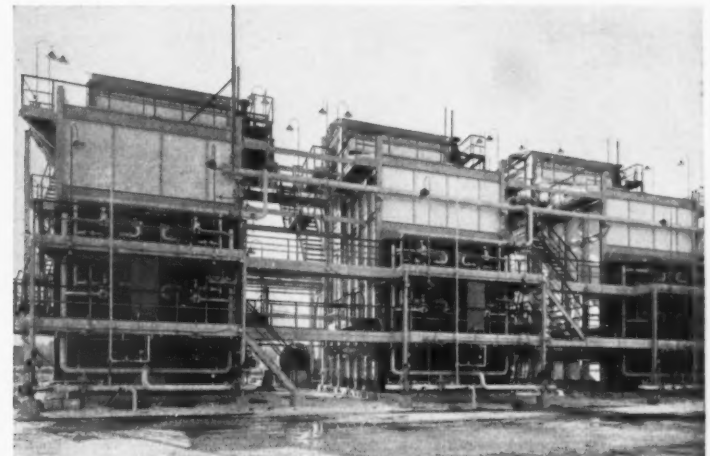
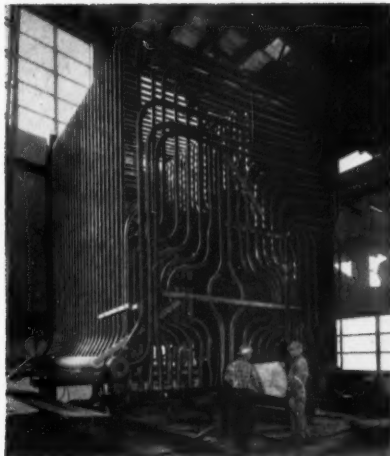
Also while working with Allegheny County, Richardson supervised preliminary studies and design for a \$25-million program of public works, including the Homestead High Level Bridge over the Monongahela River, the Jerome Street Bridge over the Youghiogheny River, and the Highland Park Bridge over the Allegheny River.

Enters Private Practice

In 1937, Richardson decided to enter private practice. He joined Walter Frick, to form the firm of Frick and Richardson. Frick specialized in structural engineering of industrial and office buildings, and the work of the firm was largely in that field. Richardson, however, could not stop dreaming of bridges, so two years and one client later, he formed his own firm. His first client was the Harris Structural Steel Company. Richardson acted in an advisory capacity for erection problems on a bridge over the Potomac River at Ludlow Ferry, Virginia. J. E. Greiner Company was the consulting engineer on the project. Richardson still has the Harris Structural Steel Company as a client, frequently advising them on erection problems on the large bridges the company fabricates.

Today Richardson's firm annually handles projects valued at \$50 million. His Pittsburgh office currently has about 15 active projects in various stages, and the firm's Philadelphia office has a number in addition.

One of Richardson's favorites was the Delaware River Turnpike Bridge, which formed the link be-



AT LEFT: Installing a 60,000 lbs/hr unit in a brewery

ABOVE: A battery of 125,000 lbs/hr units in a chemical plant

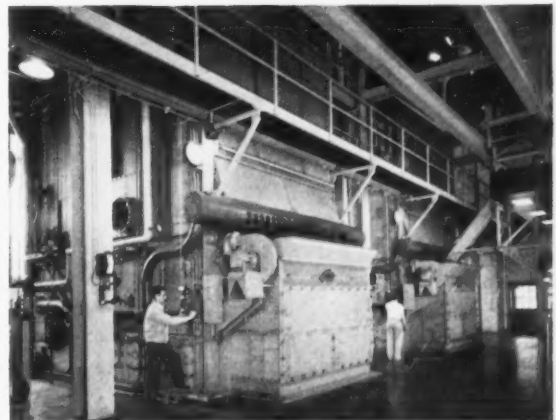
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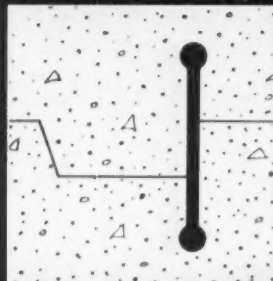
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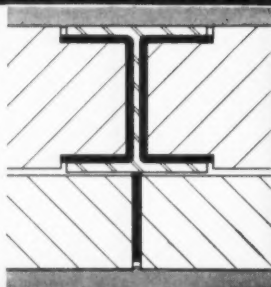
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See Sweet's Files, or Write for Information.

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tween the New Jersey and Pennsylvania Turnpikes near Bristol, Pennsylvania. His clients were the two turnpike authorities, and they also called in Moran, Proctor, Mueser & Rutledge of New York City as foundation consultants, and Harbeson, Hough, Livingston & Larson, Philadelphia, as the architects on the project.

"I always like to work with an architect on the larger bridges," Richardson explained. "I want our bridges to have clean lines and beauty."

The Delaware River Turnpike Bridge, with main spans of continuous trusses, is one of the largest bridges of its type. The 6600-ft structure is valued at approximately \$16 million and was completed and opened to traffic in 1956.

Big Bridges Are Taken In Stride

When asked if he had any unusual design problems with the bridge, Richardson said, "We have come to take major bridges in our stride. Fairly long spans and difficult foundation conditions are what we term 'normal.'" However, one unusual aspect of the Delaware River Turnpike Bridge is the elimination of all sway bracing in the central arched span. "We did not want the bridge to have a cluttered appearance, which the sway bracing would have given it. So we eliminated the bracing. Too often designers are guided by somewhat arbitrary specifications without enough consideration of actual requirements."

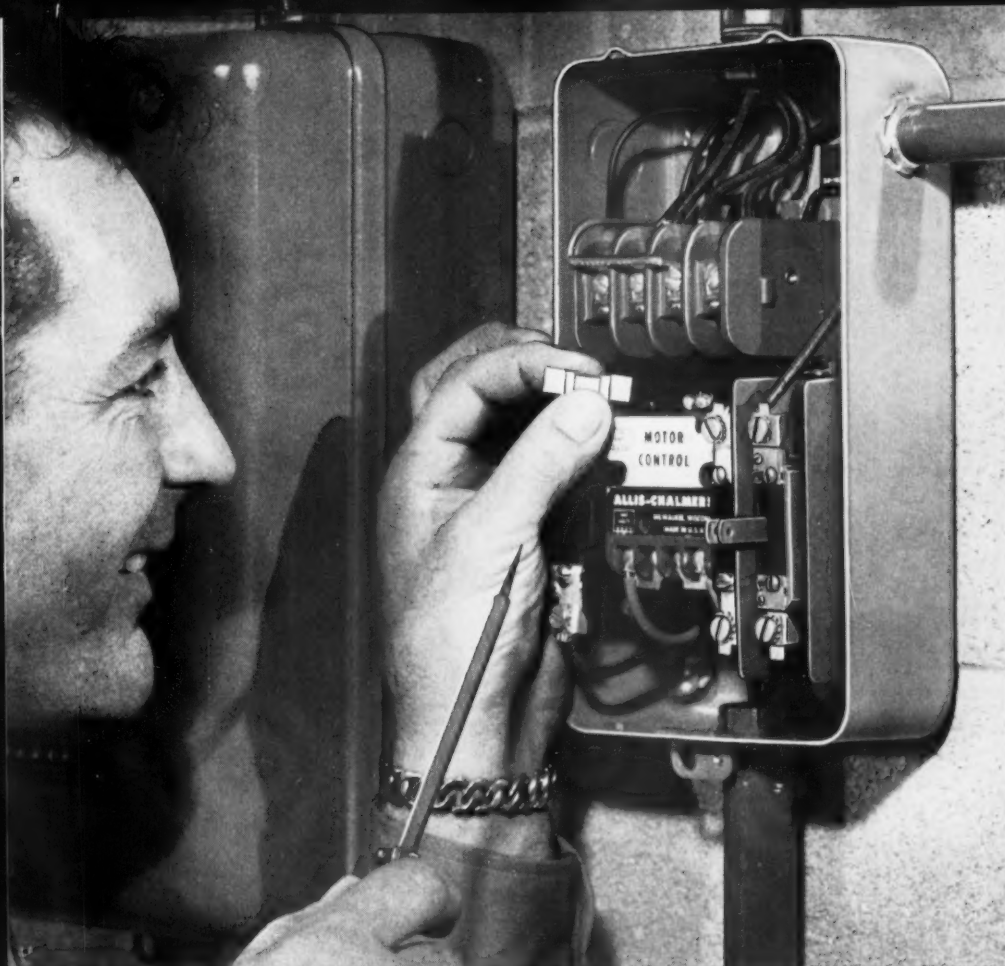
Richardson's firm also is working on two unusual bridges to lead into Pittsburgh's Point Park area. One, the 750-ft Fort Pitt Bridge, is over the Monongahela River. The other, the 450-ft long Fort Duquesne Bridge, will be over the Allegheny. Total cost of both of the bridges and their interchanges will be about \$28 million.

These two double-deck bridges are similar in design and will be the first of their kind. In the tied arch structures, box sections are used as arch ribs and trusses as ties.

Stresses Professional Activities

In managing his 170-man consulting firm, Richardson stresses registration and participation in professional organizations. Evidently he gets the idea across. His staff includes 51 registered engineers, and by coincidence there are also 51 members of the American Society of Civil Engineers.

Richardson himself is registered in Pennsylvania, New York, West Virginia, Ohio, New Jersey, Indiana, Virginia, and Nevada. He also has a certificate of qualification from the National Bureau of Engineering Registration. And he is a former member and past president of the Pennsylvania State Board of Registration for Professional Engineers. "I am also a member of the National Society of Profes-



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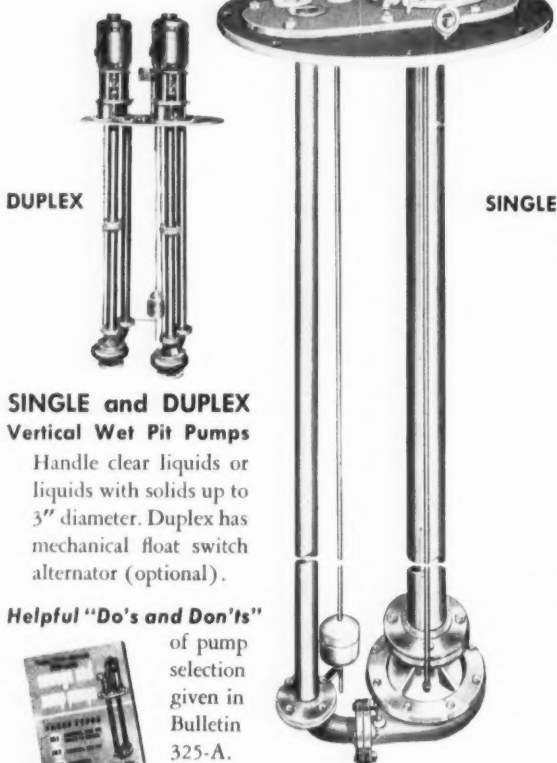
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sional Engineers, but not, I am afraid, a very active member. There is a limit to the number of organizations to which you can devote time and still operate a consulting firm."

ASCE Administrative Procedure Committee

A past national director of the American Society of Civil Engineers, Richardson currently is serving on the Committee on Administrative Procedure. This committee is studying a problem with which Richardson is quite familiar — how to keep the directors from being swamped with committee and administrative duties. "As the ASCE has grown, there has been a continuous formation of new committees and addition of duties for directors. It now has come to the point where the directors should be relieved of some of these arduous duties," Richardson explained.

Richardson also is a vice president of the engineering division of the American Road Builders' Association. "This is a good organization for any consulting engineer to join who is interested in highways. All segments of the highway field are represented in this group."

In addition to all this, Richardson is a member of the American Concrete Institute, the Society of American Military Engineers, and the American Society for Testing Materials.

New Institute Program

Currently, he is spending a considerable amount of his time planning projects for the American Institute of Consulting Engineers. One of his favorite plans is the development of an Institute program which would allow members in the Midwest and other parts of the nation to take a more active part. The Institute's council has approved a study by the Committee on Development, with N. T. Veatch of Kansas City as chairman, to explore means and suggest ways to increase nationwide activity.

"In the steady growth of the Institute (currently at 268 members and still expanding) we should also consider getting a better distribution of membership among the various fields of engineering," the president continued. At present, Institute membership is predominantly civil. "We have eight past ASCE presidents and the current president among our membership," he added. Richardson wants to see more members of the other Founder Societies joining the Institute.

More Office Space in Headquarters

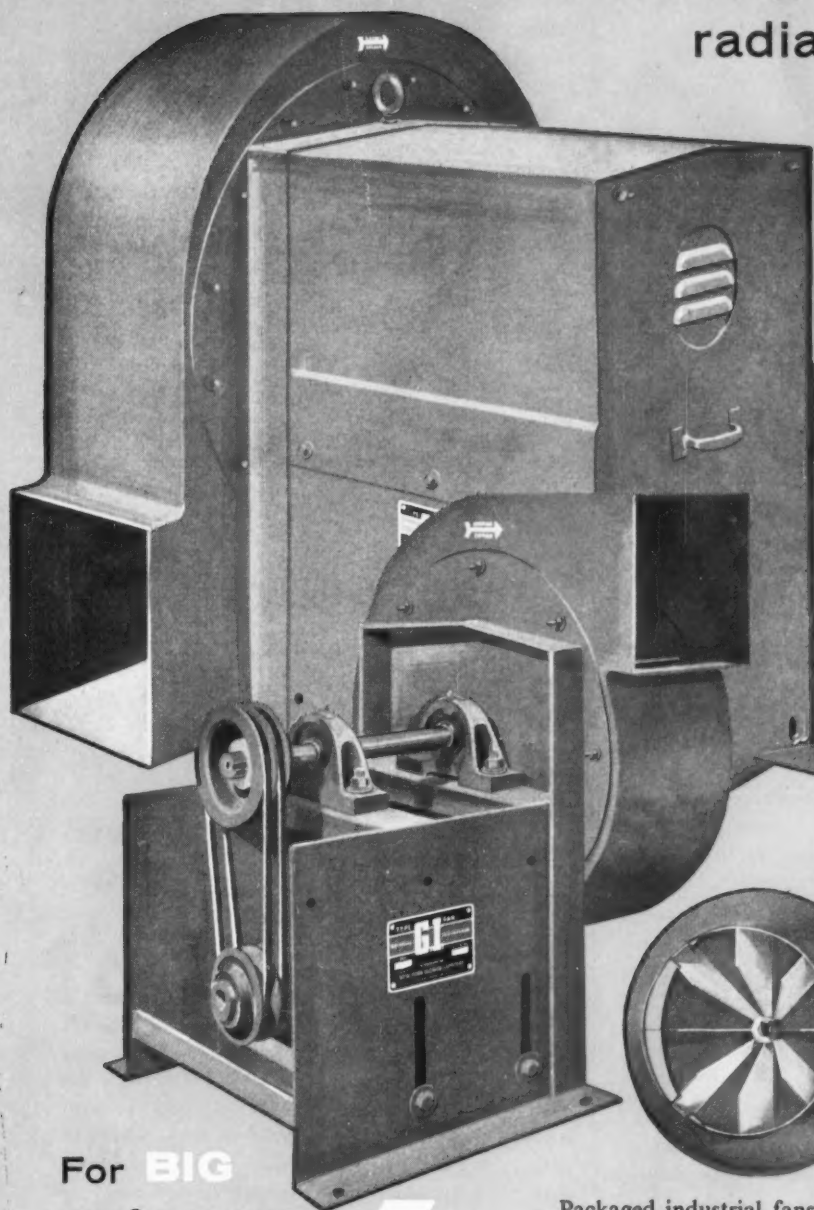
In line with this continuing growth, the Institute also is taking larger quarters in the new Engineering Headquarters. "Right now, we have only one office in Headquarters. I do not know yet how much space we will take in the new building, but we are

...economical G. I. type

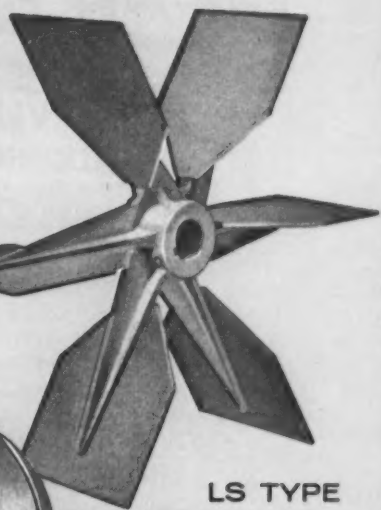
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trying to provide for the larger Institute we will have in the future."

The Institute is continuing its policy of cooperation with the Founder Societies. During the recent past the Institute in cooperation with ASCE and other organizations has worked with different Federal agencies such as the International Cooperation Administration and Atomic Energy Commission to develop more uniform practices in dealing with consulting engineers.

Cooperation was extended to the ASCE on another recent project—compilation of Manual 38, the new fee schedule. In connection with this project, the Institute is reviewing its own manual of suggested fees with the possibility of revising it to match the Civil's recommendations.

Last year a special Committee on Ethics submitted its final report, which recently was adopted and distributed to Institute members. The Code of Ethics has been supplemented by Standards of Professional Conduct intended to explain in more detail the practical application of the code.

Richardson also happily noted that the Institute is becoming more internationally minded. Institute members participated in activities of the International Congress on Large Dams, in New York City, last fall. Also, during the annual ASCE meeting, Institute members invited a number of foreign engineers attending the International Association of Bridge and Structural Engineers to attend the Institute's annual dinner.

Suggests Wise Business Policy

Institute members practice a business policy that Richardson said all consulting engineers would do well to follow. "All of our Institute members are experts in the fields in which their firms operate," Richardson explained. "Because of the rapid increase in the number of consulting engineering firms during the past 10 years, some engineers have entered fields of practice in which the firm's owners are not experts."

Richardson feels that when a client retains a consulting engineering firm for a project, the client should be able to go to the partners and principals of the consulting organization for major decisions. Instead, many consultants take projects which they personally are unable to handle and then farm out projects or assign work to subordinates who sometimes lack proper supervision.

"This happens most frequently when business is a little slow, and some consultants will take any project they can get," the Institute president added.

Prosperous times bring another problem. Engineers go to industry in large numbers after graduation, and it is difficult for consultants to hire the men they need. So the drafting and sometimes some

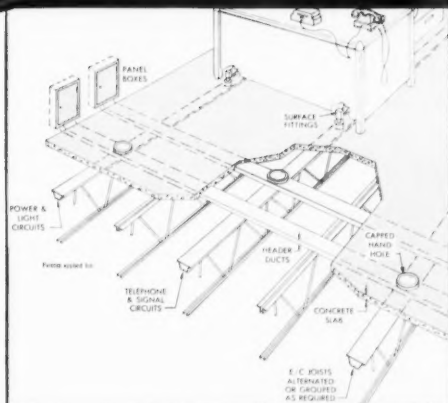
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Electrical, telephone and signal wires can be run from the panel boxes down through the header ducts, into the top chord of the E/C Joist and up through the surface fittings to desks located anywhere on the floor. Whenever desks are moved, surface fittings can be placed along the joists to service the new positions.

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of the design work also is assigned to "job shops."

"I disapprove of the use of job shops," Richardson summarized. "If consulting engineers do not refrain from such practices, they cannot hope to retain or increase their professional standing."

Public relations is another problem to which Richardson has given thought. "Of course, the best public relations in the world is a job well done. But it is a little discouraging sometimes to note the attitude of the public toward an engineer. A man can go to school for years getting specialized knowledge. Then, after he designs a highway, he finds that any man who drives a car feels he is competent to say where the highway should have been located."

Salary Practices

In the operation of his own firm, Richardson also is attempting to avoid a common pitfall of modern salary practices. When he first moved to Pittsburgh as a young draftsman, he received a salary of \$125 a month ("of course, I had some experience"). Today, a young draftsman would start at the same job for \$475 to \$500 a month. "The beginner engineer is better off than he was when I started out," Richardson noted. "But this high salary quickly levels off to the point that experienced engineers, not yet at management level, do not receive proportionate compensation."

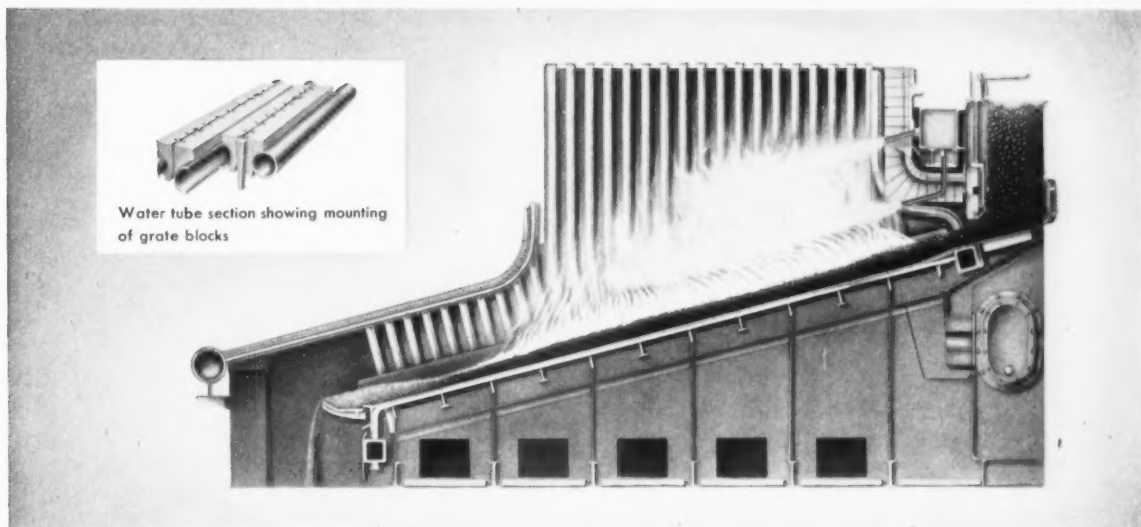
In his firm Richardson attempts to combat this trend at times of general salary increases by making them on a percentage basis. "If all employees receive the same dollar increase, the beginner gets much more proportionately than the more experienced engineer. By granting the same percentage increase, the 'middle man' benefits more nearly in accord with his experience and responsibilities."

Consultants Aid Highway Department Engineers

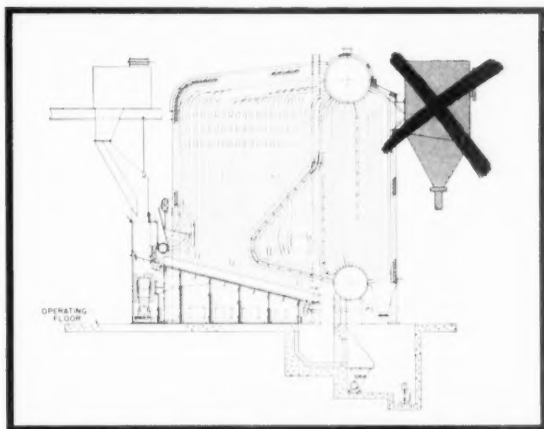
Regarding salary levels, Richardson said the consulting engineer deserves credit for improving the working conditions of engineers in highway departments. Because of the competition of higher salaries paid by consultants, those responsible for the major policies in highway departments have been forced to increase highway staff salaries to retain competent engineers.

What does Richardson think of the proposed decrease in the use of consultants advocated by the Automotive Safety Foundation following its study last year of the Pennsylvania Department of Highways? Richardson is not worried. He believes the new secretary will continue to use consultants for much of the Department's work. "The new secretary is a Republican working under a Democratic administration, and an extremely competent engineer," Richardson concluded. ▲▲

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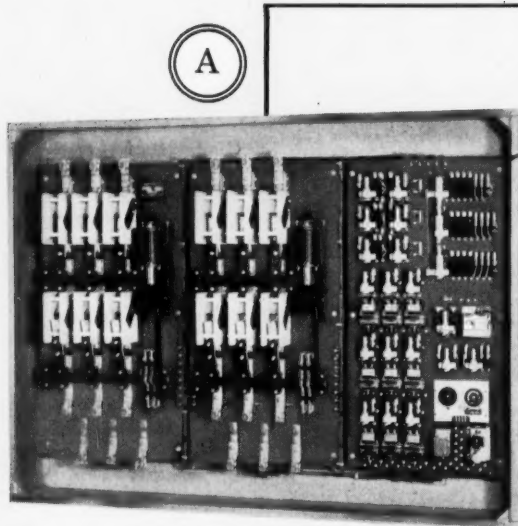


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STEP 3 When standby power source reaches proper voltage and frequency, the transfer switch transfers the load to the electric plant. Time of transfer — $\frac{1}{30}$ to $\frac{1}{6}$ of a second!

When normal power is restored, the ASCO Transfer Switch returns the load to its original feeder lines. The Starting Control then causes the electric plant to shut down.

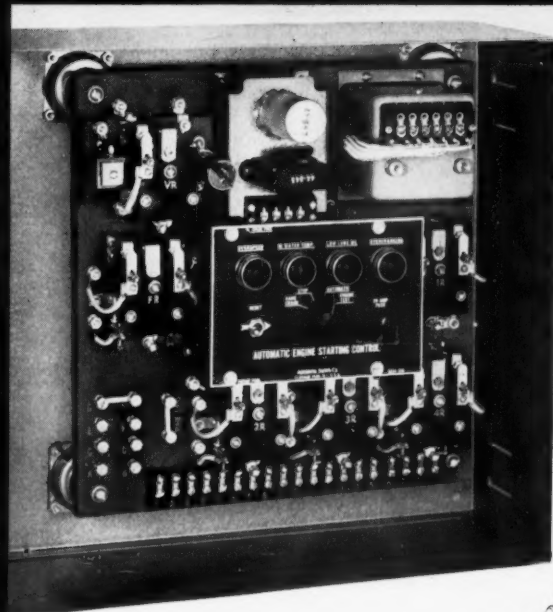
Underground hot pipes stay free from trouble...when you INSULATE WITH GILSULATE

One of the most difficult problems in designing underground hot piping



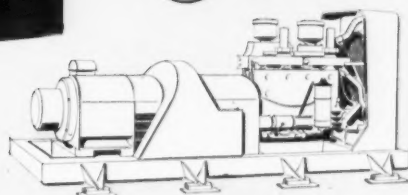
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(B)

(C)



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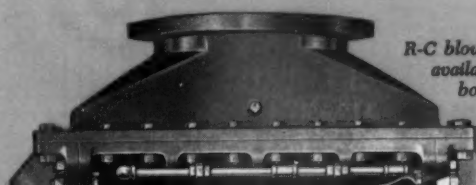
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POWER SAVINGS



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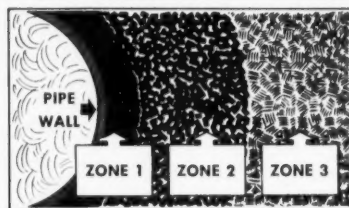
If you would like complete information on GILSULATE insulation, or would like to be put on the mailing list to regularly receive free copies of PIPE INSULATION NEWS, send your request to any of our offices.



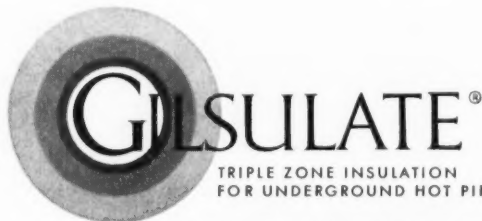
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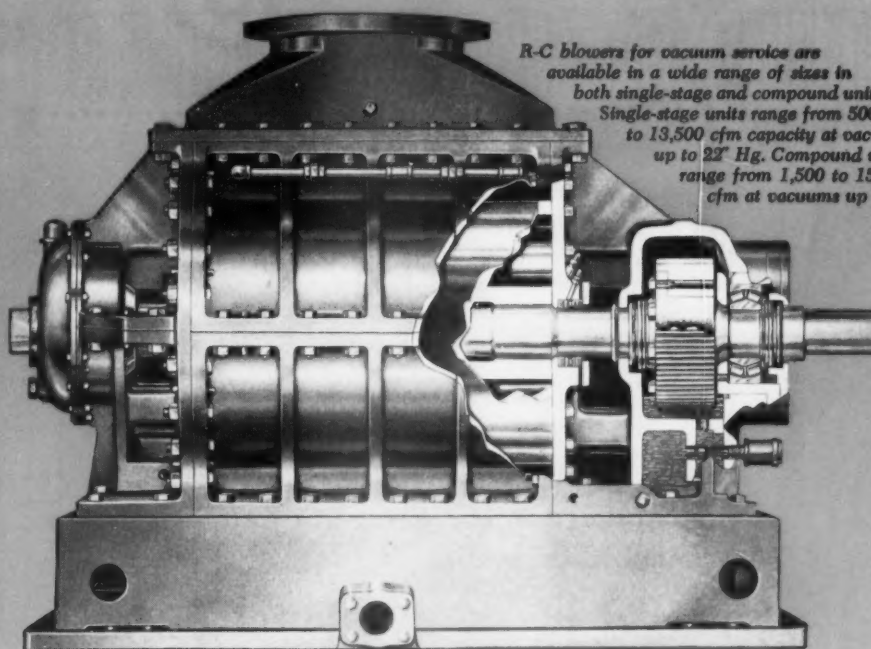
Heat fuses the GILSULATE to pipes and joints to form three zones: Zone 1, a flexible, heavy-duty water barrier; Zone 2, of firmly-cemented granular GILSULATE that provides excellent thermal insulation under wet or dry conditions; and Zone 3, which provides a final zone of thermal insulation and a support for the water-proof structure.



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...up to 25% with R-C Cycloidal Blowers for Vacuum Service

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*For additional data, please refer to pages 565-568 in **CHEMICAL ENGINEERING CATALOG**, our section in **MECHANICAL CATALOG** or write for Bulletin VP-158.*



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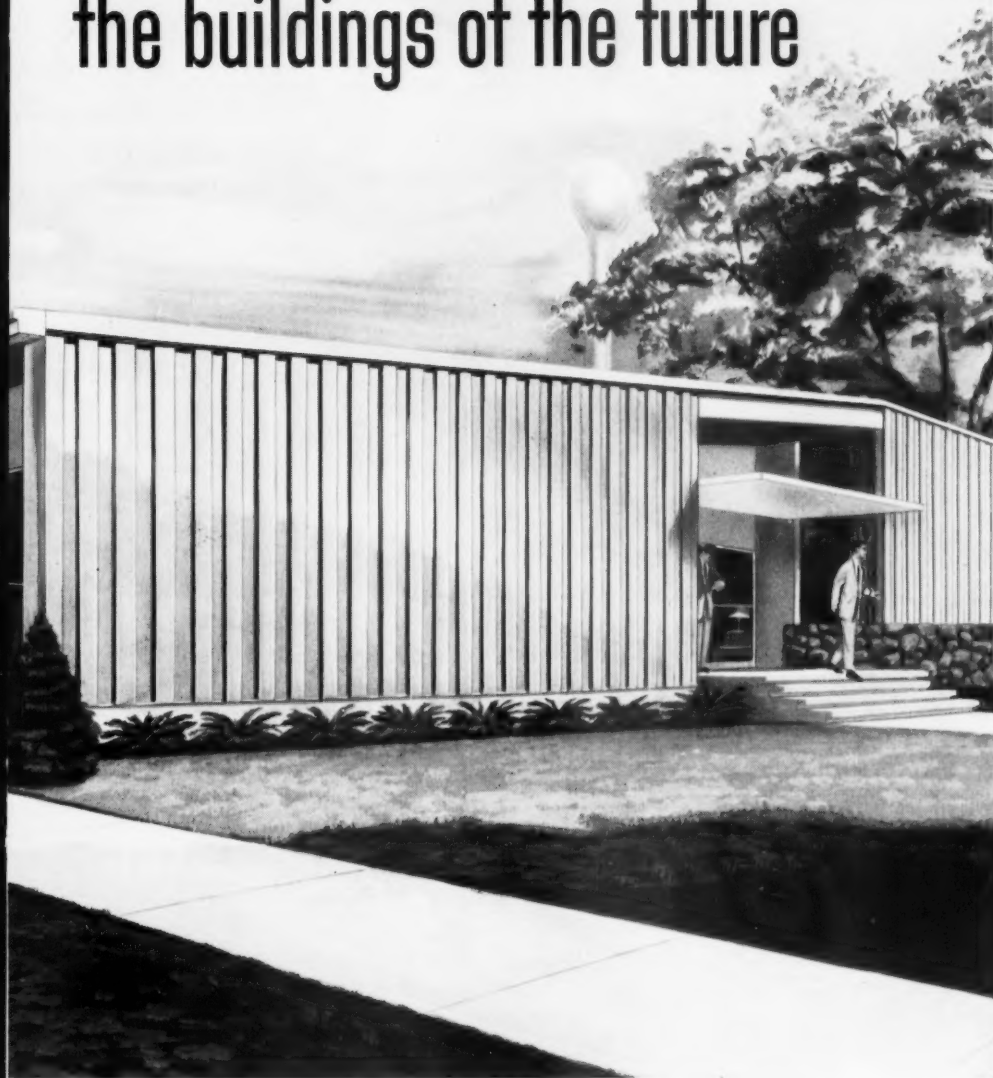
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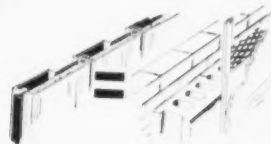
How Monopanel creates a superior wall



Each Monopanel is literally a metal plank with insulation between metal inner and outer faces. The complex configuration makes Monopanel the longest spanning . . . most rigid panel of its type.



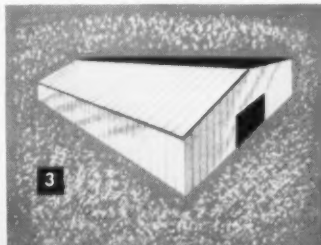
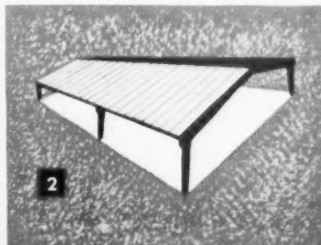
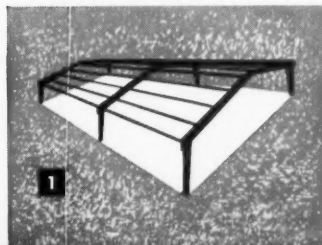
The unique double tongue and groove design creates a strong panel-to-panel joint. And double vinyl gaskets permanently seal out moisture, last the life of the building.



Monopanel is only 3 inches thick, yet is equal in insulating ability to a masonry wall of 4 inches of brick, 8 inches of concrete block, 1 inch of rigid insulation with air space and 1/2 inch of plaster.

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Butler pre-engineered components fit together so perfectly that construction is little more than an assembly job. 1. Butler structurals are bolted together and erected. 2. The Butlerib roof is attached. 3. Monopanel walls are installed by simply pushing together and fastening to the structurals top and bottom. Your building is completed and you're in business, earning profits weeks, even months sooner, than ordinary construction methods would have permitted.





Four-inch F&P magnetic flowmeter measuring influent from the grinder at the Gainesway Subdivision Sewage Treatment Plant, Lexington, Kentucky. Accuracy is unaffected by piping configurations or valve placement. Consulting engineer: Marion C. Welch, Lexington, Kentucky.

F & P OBSTRUCTIONLESS FLOWMETERS GROW WITH THE PLANT

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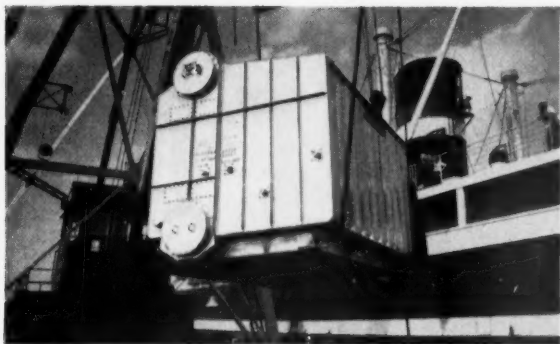
But obstructionless isn't the *only* reason by a long shot. A special feature permits F&P magnetic flowmeters to *grow with the installation* . . . from start-up to maximum design capacity. All F&P secondary instruments are equipped with a *unique* in-case adjustment that permits any flow velocity from 1-30 fps to be set at *full scale*. Furthermore, *any* F&P magnetic meter can be used with *any* F&P secondary instru-

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Get the facts on Fischer & Porter magnetic flowmeters NOW! Contact the F&P field engineer nearest you, or write for Catalog 10D1416. Fischer & Porter Company, 3359 Fischer Road, Hatboro, Pa. In Canada, Fischer & Porter (Canada) Ltd., 2700 Jane Street, Toronto, Ontario.

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▲ A C-E Package Boiler, Type VP, en route to Europe. This boiler type is available with capacities from 4,000 to 90,000 lb of steam per hr, with pressures to 700 psi and temperatures to 750 F in certain sizes. It is designed for oil or gas firing. Several hundred of these units are now in service.



▲ A shop-assembled Controlled Circulation Boiler, Type PCC, being prepared for shipment. This type unit is available with steam capacities from 80,000 to 120,000 lb per hr, and with pressures and temperatures to 1000 psi and 900 F. For special applications, designs are available to provide higher steam pressures and temperatures. Seven PCC Boilers are now in service.



▲ A shop-assembled C-E High-Temperature Water Boiler, Type HCC, being unloaded at a midwest manufacturing plant. It is one of two 12-million-Btu boilers used for plant heating. Available for capacities from 10 million to 300 million Btu, this unit type is shop-assembled in sizes up to 50 million Btu for oil or gas firing—up to 40 million Btu for coal firing. Currently, more than 50 HCC Boilers are in service or on order.

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C-E offers LARGER SHOP-ASSEMBLED BOILERS

Three service-proved designs with capacities to 120,000 lb per hr . . . pressures to 1000 psi . . . temperatures to 900 F

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Catalogs on any or all of these units available on request.

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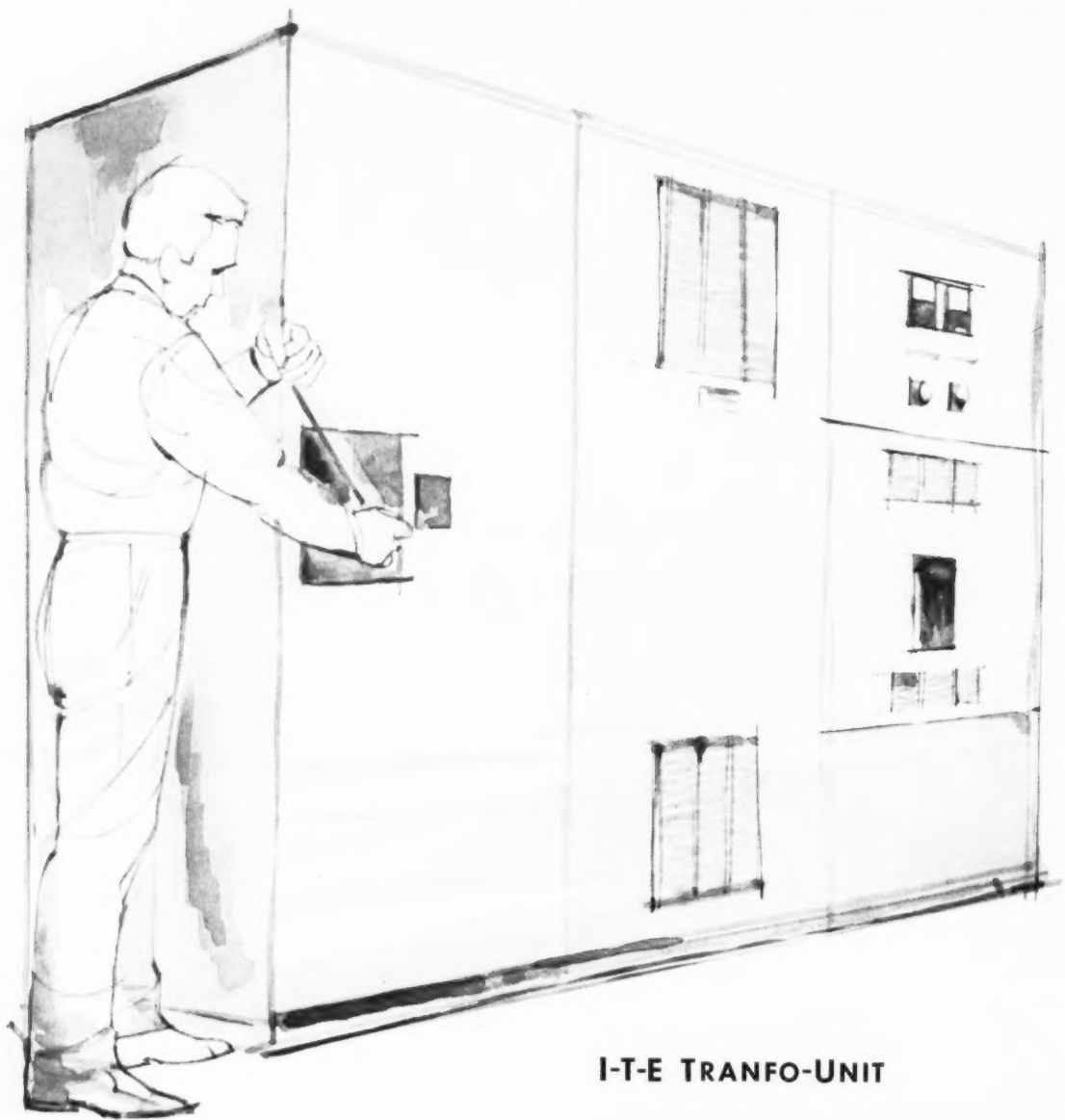


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200 Madison Avenue, New York 16, N. Y.
Canada: Combustion Engineering-Superheater Ltd.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

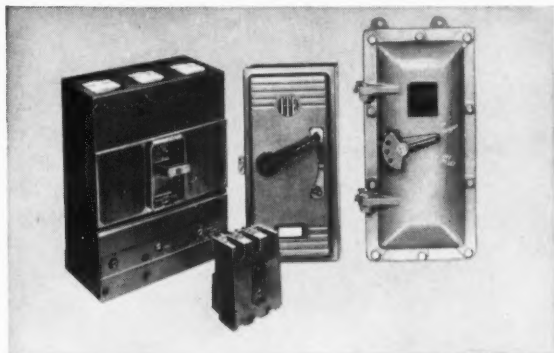
NEAT



I-T-E TRANFO-UNIT

Believe it or not, the I-T-E TRANFO-UNIT illustrated at left is a *complete secondary unit substation*. It combines in one package the primary switch, transformer and secondary circuit breakers. And it costs no more than hodgepodge arrangements of assorted gear.

The TRANFO-UNIT is ideal for bringing high voltage power right up to load areas in industrial plants or for incoming power in many commercial buildings. Because it's completely self-contained, it's safe without a fence. It saves floor space.



First choice with electrical equipment manufacturers. A generally acknowledged fact about I-T-E molded case circuit breakers is their popularity with electrical equipment manufacturers. This important group of circuit breaker specifiers consistently chooses I-T-E *more than any other brand*. There are several reasons. I-T-E offers the broadest line. Extra quality in numerous engineering and construction details actually costs you no more. And experience proves that it pays off in superior performance. Installation is particularly easy. Enclosures are available for individual breakers in a wide variety of indoor and outdoor types.

And it gives a neat, clean appearance so important in modern buildings. Delivered complete, the TRANFO-UNIT simplifies ordering and reduces cost of installation. Available in ratings up to 3000 kva.

All of the major components of the TRANFO-UNIT are products of I-T-E. Marrying them together is the result of I-T-E engineering skill . . . and of our constant effort to offer you greater value in everything that bears the I-T-E name. Why not make us prove just how sincerely we can say this?



High speed d-c protection. A fault on d-c circuits involving electrolytic processes can in most cases produce runaway currents. But I-T-E Model FB d-c circuit breakers interrupt fault currents before they get into the danger area. Interruption occurs in roughly 12 milliseconds. Currents with rate of rise of even 15 million amperes per second are stopped at an approximate peak of 60,000 amperes. This means extra protection for all associated equipment from the damage that could result from even momentary persistence of such high currents. FB circuit breakers are available in either single or double pole. Compact. Easy to install.



Safe passage for bus conductor. I-T-E metal-enclosed bus is completely protected from the hazards of dirt and weather . . . and from the normal risks of accidental damage. Unlike cable, it endures the sieges of time without wear or insulation loss. Ideal for linking transformer to switchgear, for connecting switchgear assemblies, and for channeling large amounts of power through factories and office buildings, I-T-E nonsegregated phase bus never needs attention. At the same time it can be easily tapped into at a later date. Because it is delivered prefabricated from I-T-E, installation is easy and performance is assured.

I-T-E Circuit Breaker Company

P-2

1900 Hamilton St., Philadelphia 30, Pa.

- | | |
|--|---|
| <input type="checkbox"/> TRANFO-UNITS | <input type="checkbox"/> Secondary unit substations |
| <input type="checkbox"/> Molded case circuit breakers | <input type="checkbox"/> Power switching centers |
| <input type="checkbox"/> D-c circuit breakers | <input type="checkbox"/> CORDON® circuit breakers |
| <input type="checkbox"/> Nonsegregated phase bus | <input type="checkbox"/> Other |
| <input type="checkbox"/> Metal-clad switchgear
(4.16 and 13.8 kv) | |

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

SEND COUPON OR WRITE

Get complete, up-to-date information
on I-T-E equipment.



I-T-E CIRCUIT BREAKER COMPANY



Readers' Comment

employing a man who, as a "10 percenter," procured work for him.

To me this was an extremely informative story.

I loaned this magazine to a friend, who moved his place of residence. The magazine is now lost. I would appreciate receiving another copy of this issue.

H. Lyman Cauvel
Consulting Engineer
Tulsa, Oklahoma

Article Was Informative

Sir:

Six or eight months ago, more or less, you published an article by an anonymous author. ["I Gave Up Ethics - To Eat!," December 1957]. The article described this individual as a struggling young civil engineer with no clients, and detailed how he obtained work by

Profit Sharing

Sir:

Since I completed my article on Profit Sharing, just published in your April issue, a new ruling has been promulgated by the Federal government. It should be called to the attention of your readers.

In my article, under "The Two Types of Plans" [page 115] I said current distribution plans of profit sharing need not be filed with the Bureau of Internal Revenue.

This statement is still correct.

However, the matter of supplementary benefits now has become of interest to the United States Department of Labor, in an effort to stop abuses in the management of welfare and pension funds.

Therefore, at the end of last year, Congress passed a Welfare and Pension Plans Disclosure Act. This Act requires that any business firm in the United States whose business activities affect interstate commerce in any way, and which has any type of fringe benefit, pension program, profit sharing, sick benefit, supplementary unemployment benefits, or similar benefits that are communicated or described in writing and that cover more than 25 employees, must file certain forms with the Labor Department, describing the program in detail. Also, the new law re-

quires that certain additional reports be filed annually thereafter.

Recently, the Federal government has been distributing to businesses copies of these new forms, the first of which, Form D-1, had to be filed with the Labor Department by April 1. The second form, which requires detailed financial information about the operation of the plan, is not due until approximately one year later.

There is considerable uncertainty as to how this new law will operate, and exactly who will be affected. One definite outcome: more paperwork for everybody.

Full details are available in an eight-page instruction bulletin published by the U.S. Department of Labor, Bureau of Labor Standards, Welfare and Pension Reports Division, Washington 25, D. C.

Arthur Spaet, Partner
Slocum & Fuller
New York, N. Y.

Comment from Canada

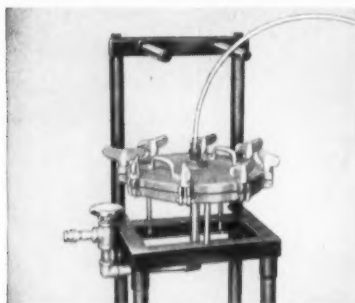
Sir:

Your professional magazine CONSULTING ENGINEER, January 1959 issue, was transferred to our headquarters in Montreal with a remark on your "Heard Around Headquarters" column.

You refer in your article to the Corporate Practice battle fought on new battlegrounds and include mention of the Province of Quebec.

The practice of professional engineering in the Province of Quebec is regulated by an act of the Provincial Legislature called "Revised Statutes" 1941, chapter 270. It, in particular, defines clearly that the right to practice engineering is limited to members of the Corporation and to become a member you either have to be a university graduate or qualified through

NEW PRODUCT



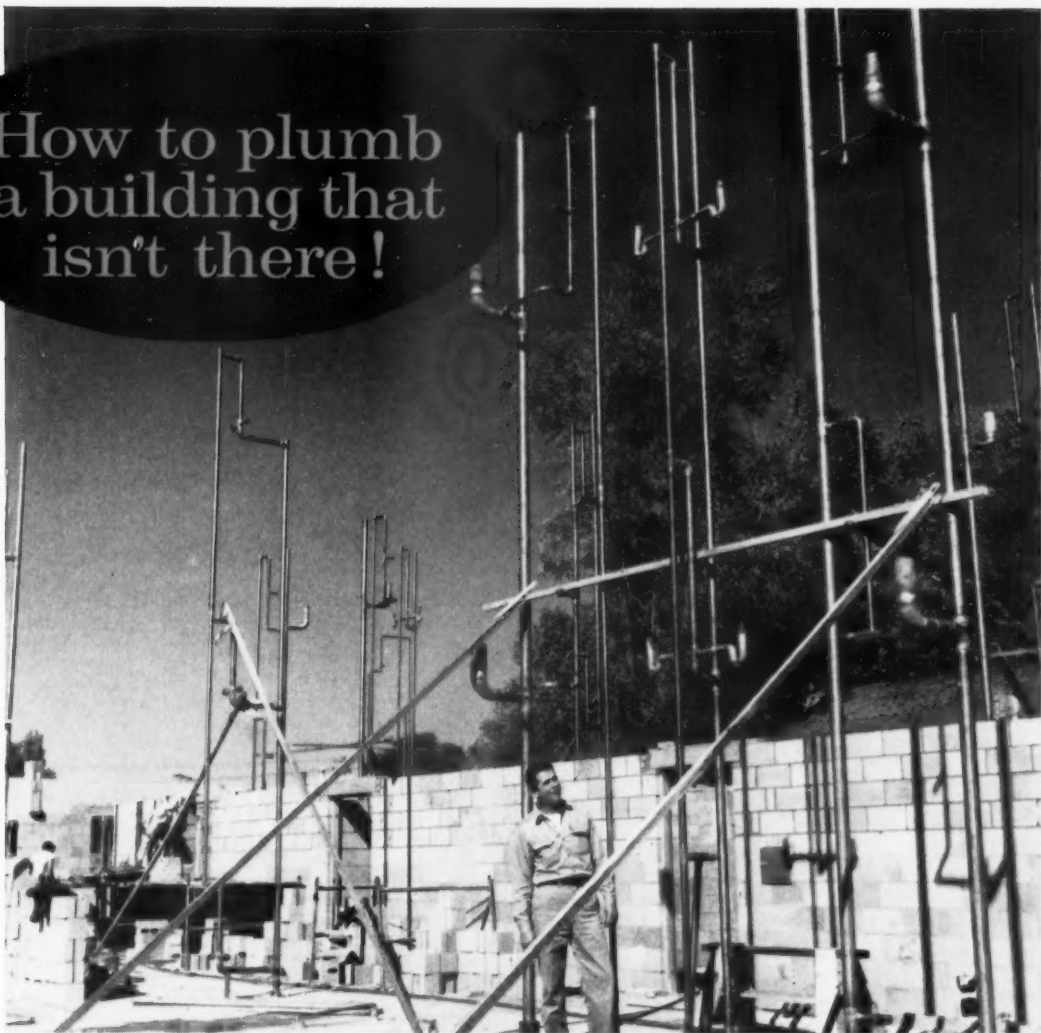
BARNSTEAD "MF" SUBMICRON FILTER FOR REMOVAL OF PARTICLES TO 0.45 MICRON

This new Barnstead "MF" Submicron Filter for either distilled or demineralized water, has been developed to remove sub-microscopic particulate matter which may cause trouble in some of the new processes in electronic and nucleonic fields. The Barnstead "MF" Submicron Filter will filter out particles as small as .000016 inches, thus permitting a filtering technique not before possible on a production basis.

Each Barnstead "MF" Filter plate can filter up to 100 gallons per hour. Multiple plates can be employed to obtain larger flow rates.

Write for new bulletin #141 to the Barnstead Still and Sterilizer Co., 44 Lanesville Terrace, Boston 31, Massachusetts.

How to plumb
a building that
isn't there!



...with NIBCO copper fittings

Residents of Denver couldn't believe their eyes as they watched the Alida Rae Apartment building start to go up. The foundations were hardly in place before the plumbing lines were installed.

There was no error. Joe Harris of Harris & Company Plumbing was merely using a new technique, worked out with S. W. Haan, the architect/engineer, to save space, time and money.

With NIBCO fittings from Amstan Supply, Harris employees (members of Denver Plumbers' Local #3) prefabricated a copper system for this three-story building at the shop, hauled it to location and set it up. With no bother, no fuss, they completed the entire plumbing in three trips to the site: (1) Laid underground lines; (2) Set the prefabricated "trees"; (3) Set the fixtures.

If you are interested in more details, write
NIBCO INC., Dept. J- 6705 Elkhart, Indiana

SEND FOR FREE DRAINAGE CATALOG DWV-2



NIBCO

examinations approved by the Corporation's Board of Examiners.

For the last five years, a Committee on directing principles has studied this problem and has come out with different recommendations, but could never reach unanimity. In fact, in your column you discuss one part of one report of a committee which was submitted in 1957. The Council of the Corporation has never endorsed the report and has never requested that any amendment be requested to our Act to allow corporate practice.

On the contrary, the Council of our Corporation has taken a firm stand and has, in two subsequent letters, informed all members of the Corporation of the prescription of the Act and has requested that everyone conform to the law.

The Council of our Corporation realizes that, through tolerance, a certain number of companies have styled themselves as engineers and have offered engineering services to the public. The Council has re-

quested that such companies abandon that practice and intends to attain its purposes in a gentleman-like, but firm manner.

Our act underwent a recent amendment in the Quebec Legislature, but the above referred principles have not been changed. As soon as a copy of the revised act is available, I will forward you an original copy.

Guillaume Piette, President
Corporation des Ingenieurs
Professionnels de Quebec
Montreal, Quebec, Canada

Legal Aspect

Sir:

I wish to compliment you on the department known as "The Legal Aspect," written by Melvin Nord, P.E. So much of our work has become intertwined with Legal Eagles, that it is refreshing that you see fit to devote valuable space to this phase of our work.

Perhaps, at the end of his current series on the Law of Real Prop-

erty, Mr. Nord can suggest several recognized texts in this field which he would recommend as belonging in every engineer's library as a reference work. Or perhaps you could include such information in the Book Review section.

If tear sheets are still available of the current series on the Law of Real Property, I would appreciate the receipt of same.

Thank you for only one of the invaluable services your magazine has rendered to me.

Alan A. Kurtis, P.E.
Consulting Engineer
New York, N. Y.

Pleased With New Reviews

Sir:

I was glad to see a review, or perhaps I should call it a discussion on something else beside an engineering book. I am referring to your dissertation on Henry Adams, Pepys' Diary, etc. I would like to see this sort of thing more often.

Tom Weyand
Brender and Brender
Engineers and Architects
Wayne, Michigan

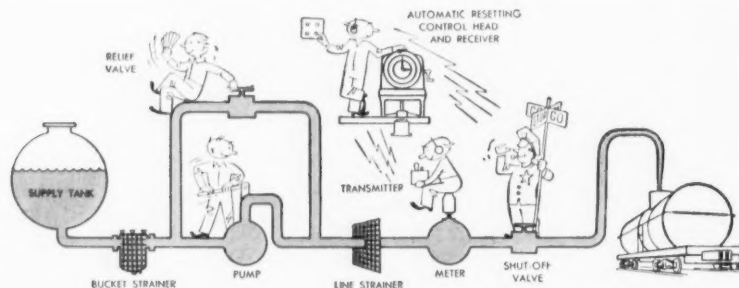
Discrepancies

Sir:

As a matter of a record only, I should like to comment on a discrepancy existing on page 101 of the March issue in the section Test Parameters. The sentence states the equivalent of 300 cc per min. as about 3 quarts per min. The equivalent of 300 cc per min. is approximately 1/3 quart per min. The discrepancy is an obvious one and should be construed as an oversight, since the report explains very well the quantities used. Although I am confident that the apparatus can be made to handle 3 quarts per min., the test data presented is based on 300 cc per min.

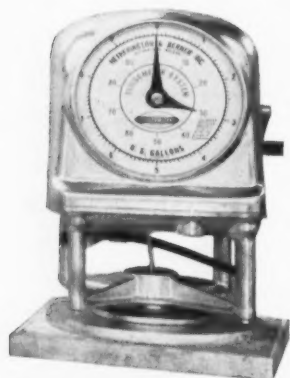
Louis J. Guarino
Consulting Engineer
Washingtonville, N.Y.

● ANOTHER ERROR: CAPTION UNDER FIG. 2 SHOULD READ "... SECTIONS 2 AND 4 ARE FILM BARRIERS." ▲▲



TYPICAL REMOTE CONTROL FLUIDOMETER SYSTEM

**For Use Where Valves Must Be Located
In Hard-to-get-to Places**



This animated picture illustrates a typical remote control Fluidometer application. Remote control of this general type is recommended when plant conditions or arrangement make direct control impractical or impossible. With a system of this type the Fluidometer control head can be located away from the meter. Shown at the left is the automatic resetting control head, which controls the operation of the shut-off valve to give completely automatic batching. Available either jacketed or unjacketed—"tailor made" to fit your needs. New Bulletin FI-56 will be sent on request. For information on jacketed pipe and fittings write for Bulletin J-56.

HETHERINGTON & BERNER INC. • ENGINEERS-MANUFACTURERS
710 KENTUCKY AVENUE INDIANAPOLIS 7, INDIANA



FILE REFERENCE

FACT SHEET



Elevated Water Tank Solves Pressure Problem In Ashland, Ohio

Don T. Hostettler, Mayor
Melvin Bauer, City Engineer
Edward F. Petzke, Supt. of Water Works
Uhlmann Associates,
Consulting Engineers
Columbus, Ohio
H. E. Bonham, Project Engineer
Graver Tank & Mfg. Co.
Division Union Tank Car Company
Design, Fabrication and Erection

Type: Double Ellipsoidal Elevated Tank
Capacity: 200,000 gallons
Height to Overflow: 129' 11"
Head Range: 29' 11"
Diameter of Tank: 36' 0"
Built to AWWA Specifications

THE PROBLEM

The City of Ashland, Ohio, was growing, and it was literally growing uphill. For years Ashland's water needs had been served from a 2,000,000 gallon reservoir on a hillside above the town. Three years ago the city annexed 1,850 acres adjoining the County Fair Grounds, located well above the reservoir. The pumping station could not maintain adequate water pressure for the new residential development.

THE SOLUTION

Uhlmann Associates were selected by city officials as consulting engineers. They made a detailed study, giving special attention to the problem of adequate water pressure in all areas. They recommended construction of a 200,000 gallon elevated water tank on high land near the Fair Grounds as well as a new pumping station at the present reservoir.

Graver was selected to design, fabricate and erect the elevated water tank. Thus supplemented, the new Ashland water distribution system provides ample pressure in all areas and will meet not only the anticipated growth of the city but also the annual peak loads at the time of the County Fair.

Water storage and pressure problems are being solved regularly by villages and cities across the country with Graver's help. Graver's experience of over a hundred years with tank fabrication and erection contributes directly to the solution of these problems, through cooperation with the consulting engineers.

GRAVER TANK & MFG. CO.

DIVISION—UNION TANK CAR COMPANY
EAST CHICAGO, INDIANA

New York • Philadelphia • Edge Moor, Delaware
Pittsburgh • Atlanta • Detroit • Chicago • Tulsa
Sand Springs, Oklahoma • Houston • New Orleans
Los Angeles • Fontana, California • San Francisco
Seattle • Caracas, Venezuela

**BUILDING FOR THE FUTURE ON A CENTURY
OF CRAFTSMANSHIP IN STEELS AND ALLOYS**

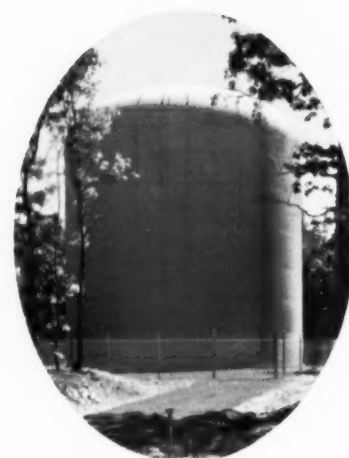
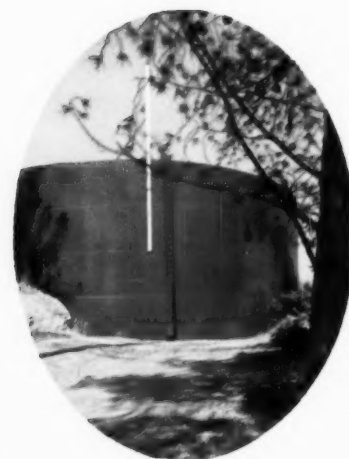


DESIGNED, FABRICATED AND ERECTED BY



WHICH WILL BEST HANDLE YOUR WATER STORAGE?

Standpipe—like that above for Niskayuna, N. Y. or that at the lower right for Norwalk, Conn.? Reservoir—like that at the top right for Beverly Hills, Calif.? Elevated tank—like the one at the right, one of two for Joliet, Ill.? Or a pump suction tank? Graver is long experienced in fabricating and erecting tankage of all types for many purposes. The most suitable tankage for your water storage needs is provided in collaboration with your consulting engineers and water department officials.



GRAVER TANK & MFG. CO.

DIVISION—UNION TANK CAR COMPANY
EAST CHICAGO, IND.

GRAVER®

*Plants and Offices
Across America*

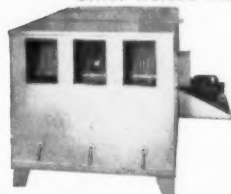
SILENCE
on the air



WRC, WRC-TV BUILDING, Washington, D. C.
General Contractor: Joseph F. Nebel
Architects and Engineers: Chatelain, Gauger & Nolan
Mechanical Contractor: W. G. Cornell Company, Inc.

FOR A MODERN RADIO AND TELEVISION CENTER *Marlo* EQUIPMENT PROVIDES COMFORT, QUIETNESS AND FLEXIBILITY

Comfort conditioning a television center places two extraordinary demands on the air conditioning system. First of all, it must be *quiet*—free from rattles, squeaks, rustles and other noises that supersensitive microphones could pick up.



Multi-zone unit



Central station unit

Next, it must be *flexible*—adaptable to differing environments: tele-casting areas with batteries of heat-producing spotlights; film storage vaults, where temperature and humidity must be closely controlled; and general offices, where normal heat-load conditions prevail.

In the new WRC and WRC-TV building, NBC outlet in Washington, D. C., these special needs are met with a system incorporating Marlo multi-zone units, central station units, water coils and steam coils—28 pieces of equipment operating quietly and dependably.

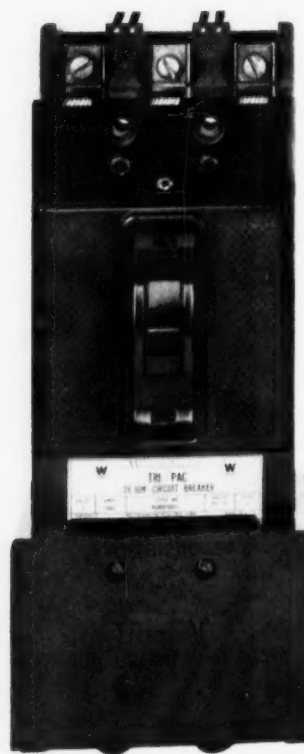
In the complete Marlo line, you'll find equipment of the type and size to fit your air conditioning needs, too. Ask the Marlo representative in your area, or write to us for further information.

Marlo coil co.

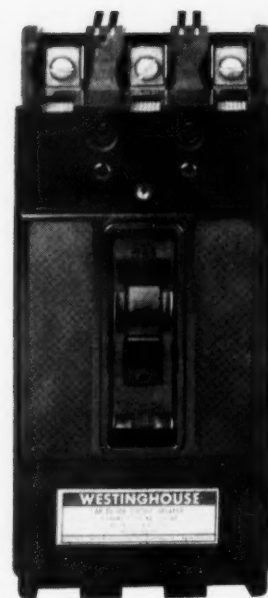
SAINT LOUIS 11, MISSOURI

Quality Air Conditioning and Heat Transfer Equipment Since 1925

WHO ELSE MAKES THIS MANY TYPES OF CIRCUIT BREAKERS?



TRI-PAC†
current-limiting breaker for 100,000-amp faults



THERMAL-MAGNETIC
the industry standard

NOBODY BUT WESTINGHOUSE! It's true! Only Westinghouse offers you six complete lines* of circuit breakers—to solve six different kinds of circuit protection problems.

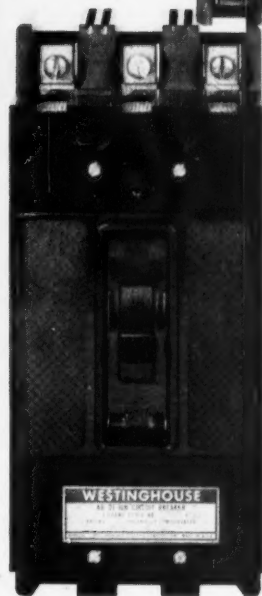
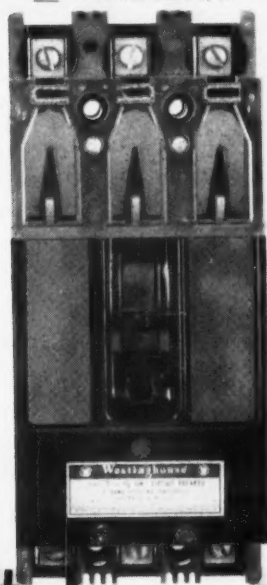
Here's what that means to you: You don't have to accept any "cure-all" type of breaker for your special applications. You can get the right breaker—designed by Westinghouse to do just that special job.

And these aren't high-priced "special" breakers. They're Westinghouse

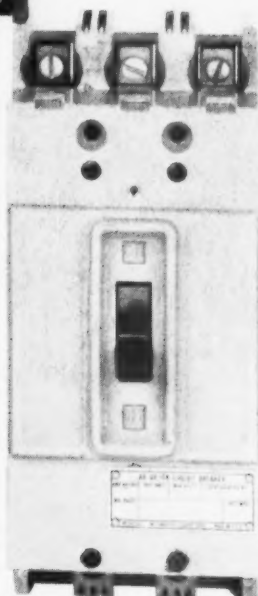
*Three of these breaker lines are Westinghouse exclusives!—(Saf-T-Vue,† Ambient-Compensated, MARK 75†)

†Trade-Mark

SAF-T-VUE
see the contacts are open



AMBIENT-COMPENSATED
for operation in changing ambients



MARK 75
75,000-amp interrupting capacity!



FRONT-ADJUSTABLE
change the setting with a screwdriver

standards—available now in most any frame size, rating or interrupting capacity—in literally thousands of combinations.

We suggest that next time you've got a problem involving circuit protection, call on Westinghouse. Chances are the answer is already in our warehouse. For further information on industry's only complete line of circuit breakers, please contact Standard Control Division, Westinghouse Electric Corporation, Beaver, Pa. Or call your nearby Westinghouse sales office.

J-39263

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS



AND NOW... WESTINGHOUSE GIVES YOU NEW ENCLOSURES

for industry's only complete line
of circuit breakers

New breakers! New enclosures! Both from Westinghouse!! This new line of Westinghouse AB-I breakers is designed to hold *any* of the six basic lines of Westinghouse circuit breakers described on the preceding two pages. Mark 75—Ambient-Compensated—Tri-Pac—Front-Adjustable—Thermal-Magnetic—Saf-T-Vue—*any* of them!

It means almost unlimited versatility for your AB-I installations. You can get 100,000-amp interrupting capacities, visible contacts, ambient compensation...all with this new line of Westinghouse AB-I breakers.

These new enclosures are a cinch to install, too. They've got wide wiring gutters, well-placed knockouts and side-hinged covers. A neutral pad, already drilled and tapped, accepts a complete range of neutral bars for easy field installation.

There's also an optional safety interlock (see below) that automatically holds the breaker handle "off" when cover is opened. And a new trunk latch on the cover for an easy-to-close, dustproof seal.

Whether you wire these new AB-I's yourself—or supervise the men who do—you're going to appreciate the time savings and adaptability of this all-new AB-I lineup.

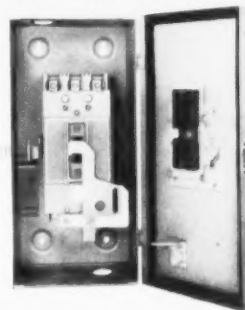
For additional information, please contact your nearby Westinghouse sales office or distributor. Or write to: Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa.

J-30267-R

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Westinghouse EXCLUSIVE
— safety interlock available as low-cost optional!





Photoelasticity in Structural Design

(page 122)

The Readers' Guide

Dr.-Ing. P. Walter is one of Germany's most distinguished and respected consulting engineers, and his son, Dipl.-Ing. Hans Walter, is one of the better engineers in his firm. The firm does all types of engineering design work and has handled some very large industrial projects in Germany and out, but they are particularly well known for heavy industrial structures. In an article in this issue, "We Study Stresses with Polarized Light," Hans Walter tells how he set up a photoelasticity laboratory for the firm so that he could study complicated structural stresses with plastic models placed in a polariscope. Stress analysis of machine components has been done in this way for a number of years, and Walter certainly is not the first to use a polariscope for structural analysis, but his is one of the few consulting engineer offices to have its own photoelasticity laboratory. Yet, the laboratory equipment is not expensive, and it could pay for itself quickly by making possible the saving of materials in structural work. This type of analysis guides the designer so that he can position his reinforcing with more accuracy and can reduce it to the minimum actually required for the structure. It is an interesting method and deserves more attention in this country.

There are about 25,000 unregistered, part-time consultants at work in this country, engaged in selling their services to hundreds of thousands of clients. Most registered engineers in private practice would look on their activities more with amusement than with competitive envy. They are the water dowzers who make at least a part of their living water witching for farmers and even for local industries. Most of us are inclined to laugh at water witching, but many intelligent people still believe in the supernatural powers of the willow fork or the man holding it. They "saw it work." Intrigued by this continued belief in dowsing, two good Ph.D's, Evon Z. Vogt, associate professor of anthropology at Harvard, and Ray Hyman, now a research consultant in behavioral studies for General Electric, set out to learn the truth about water witching. Their findings are being published in a book, *Water Witching U.S.A.*, just now coming off the University of Chicago Press. This good publisher has permitted us to extract from the manuscript and print portions of it for the readers of *CONSULTING ENGINEER*. If you find this sample, "How Water Witching Works," interesting, you should get a copy of the book when it gets to your bookseller in a week or two.

How Water Witching Works

(page 136)

Reporting Nuclear Hazards

(page 108)

An important part of nuclear reactor design is the preparation of a hazards report. This report must be filed with the Atomic Energy Commission's Advisory Committee on Reactor Safeguards and receive its approval before the project can go ahead. The hazards report is no simple rundown of likely accidents; it is a full and thoroughly documented study of all conceivable accidents and the effect of those accidents on the plant, the personnel, and the population of the area around the site. There is no doubt that an enormous responsibility falls on the engineers who prepare hazards reports, and conservatism and caution is vital, but Karl H. Puechl, the author of "Making Hazards Reports Make Sense," warns that conservatism can go too far. Safety standards are being established on the basis of containment specifications and safety systems accepted by the Committee for plants already built and now being built, and if a plant is over-designed, by intent or by accident, that means there is the likelihood that future plants will have to meet the same stiff standards, whether they make sense or not. More and more consulting engineers will find themselves called upon to undertake preparation of these important studies, and Mr. Puechl gives a full explanation of how the job should be done.

720 feet straight up...

NICOLET

ASBESTOS HONEYCOMB

The new Union Carbide Building, now under construction in New York City, will tower 720 feet above Park Avenue. When completed in 1960 it will be the world's tallest "Curtain Wall" building.

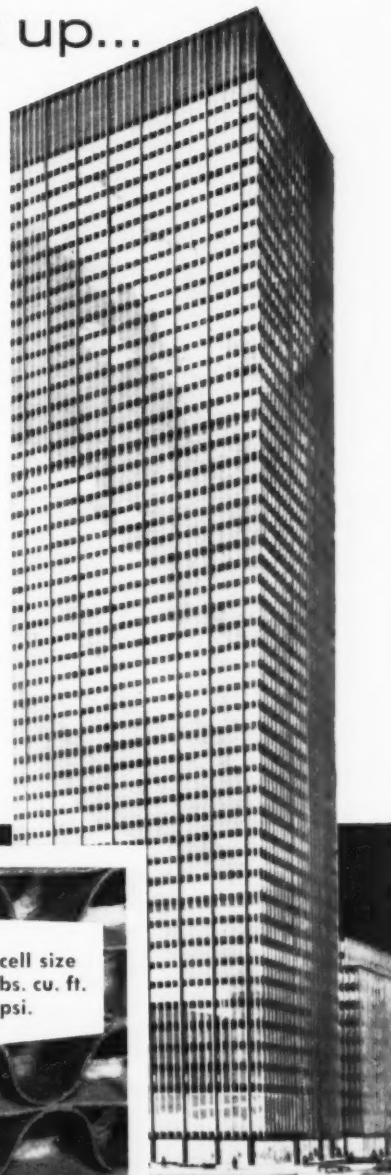
Some 11,000 building units, each 13 feet high and 5 feet wide and weighing less than 150 pounds, will be used.

Each unit will be self-contained, complete with window frame, spandrel and column panel.

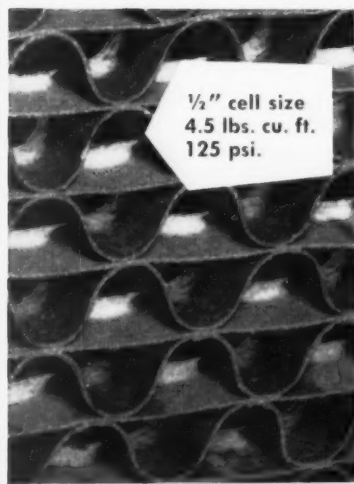
The spandrel panels are prefabricated as a "sandwich". They consist of a black matte stainless steel outer sheet, an aluminum back-up sheet and between, a $1\frac{3}{4}$ " thick layer of NICOLET ASBESTOS HONEYCOMB.

NICOLET ASBESTOS HONEYCOMB is an impregnated, featherweight panel with great compressive strength (125 psi) and rigidity. It has high temperature and fire resistance and is impervious to humidity, water and vermin.

FOR FULL INFORMATION as to how Nicolet Asbestos Honeycomb may be tailored to your exacting requirements, write, wire or phone us.



The use of Nicolet Asbestos Honeycomb in curtain wall panels adds immeasurably to the practicality and economy of this type of building construction. The intrinsic strength, resistance to abnormal elements and lightness of this core are factors that will meet the most rigid building codes and economies.



$\frac{1}{2}$ " cell size
4.5 lbs. cu. ft.
125 psi.



NICOLET INDUSTRIES, Inc.

FLORHAM PARK, NEW JERSEY

Norristown, Pa. • Hamilton, Ohio

DISTRIBUTED THROUGHOUT UNITED STATES.

Curtain Wall Fabrication and Installation, General Bronze Corp. • Spandrel Panel and Core Assembly, Wolverine Porcelain Enameling Company • Permyron Process (Black Coating), Union Carbide Metals Company • Architects, Skidmore, Owning & Merrill • General Contractors, George A. Fuller, Company

If the average man were given a list of great engineers and asked to identify them and their works, he probably would not pass the test with flying colors, but he no doubt would recognize some of those 19th century English engineers like Watt, Rennie, Stephenson, Smeaton, and Telford. If credit for the relative familiarity of the public with these names should go to anyone, it should go to a prolific writer named Samuel Smiles. It was Smiles who wrote *The Lives of the Engineers*, which sold widely and well in the last half of the 19th century. Dr. Thomas P. Hughes, associate professor of history at Washington and Lee University, now studying the history of engineering in Munich on a Fulbright Fellowship, has made a study of Samuel Smiles and his biographies of engineers. We publish his paper in this issue under the title, "Samuel Smiles — The Engineers' Alger." Every reader of CONSULTING ENGINEER will enjoy this well written piece and will finish it with the hope that a 20th century Smiles will show up.

The Lives of the Engineers

(page 114)

Designing Freight Elevators

(page 128)

There have been many complaints of late concerning the practice of elevator design engineering by manufacturers. Yet, it is not unknown for consulting engineers, themselves, to call on the manufacturers for much more than product engineering when a project calls for elevators. Perhaps this is not too bad when dealing with passenger elevators, where standard models are available and the whole system comes close to being a product. But freight elevators are mostly custom designed and custom built and demand considerable engineering of the type best done by an independent consulting engineer. Gustav B. Gusrae is one of the few consulting engineers in the country who specializes in elevator design, and his services have been used by many other consulting engineers and architects as well as owners. In his article "The Proper Approach to Freight Elevator Design," Gusrae gives an enlightening outline of the way a consulting engineer should go about designing a freight elevator. With this background and some further detailed study, any consultant should be in a better position to design and specify freight elevators for his client.

Even the simplest design project takes at least four skills — structural, mechanical, and electrical engineering, and architecture — as Perry Coke Smith points out, and many projects may require more. These skills must be brought together early in the fundamental planning stage and must be kept working as a whole until the design is complete. Smith says that this calls for the careful development of a "Design Work Plan" that will show what all the decisions are, who is to make them, and according to what time schedule. His firm, Voorhees Walker Smith Smith & Haines, has made a study of fundamental planning methods, and Mr. Smith explains the kind of program that has evolved. The use of this method would be a great timesaver for other consulting engineers, and it would permit them to know where they stood at any particular time during the early planning stages. Smith's work plan brings all of the skills together and also gets the client appropriately into the act.

Coordinating Fundamental Design Work

(page 102)

Departments That are Different

We understand that there may be a few of our readers who overlook, from time to time, some of our regular Departments. That we must caution against, for it is in these columns that the alert consultant is likely to find out what really is going on. Take, for example, our "Heard Around Headquarters." This is about the only place in any magazine that you can get the important news of what is going on at the top in the important engineering societies. Many of the men high up in these national organizations tell us that they read this column carefully to find out what it was they really voted on at their last board of directors meeting. And this is about the only place you can learn what the societies are likely to do before they do it. Most important, CONSULTING ENGINEER, is the only magazine that carries a lot of society news and yet does not have to follow any society line. We can condemn as well as praise, so our readers get the whole story, not just the society's side. There are other important departments, too, well worth your reading time.

HONEYWELL ANNOUNCES

*the most recent
development in
centralized
temperature control*

NEW SELECTOGRAPHIC SUPERVISORY DATACENTER*

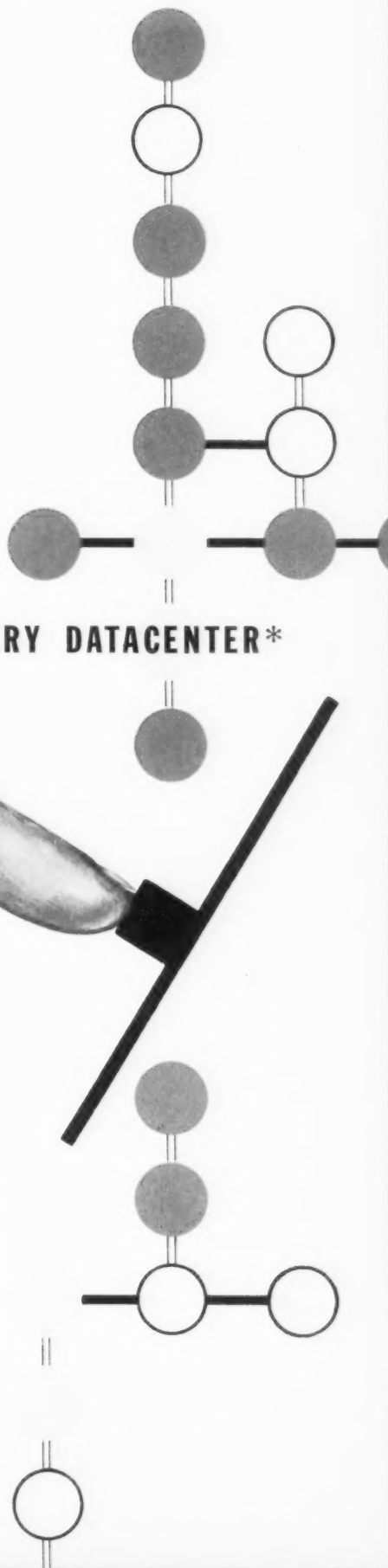


Honeywell's revolutionary temperature control console features floor plan and system projection. It automatically gives a visual picture of an entire air conditioning system's operations in even the largest buildings.

It provides operating efficiency, better use of specialized manpower, longer equipment life, attractive display of engineering design and more comfortable buildings—all from a standard unit only 4' wide, 4' high and 2' deep.

The Selectographic Supervisory DataCenter is a significant advance in a concept pioneered by Honeywell, whose central control panels are now being used in all kinds of buildings: hospitals, banks, schools, theatres, office and industrial buildings, hotels and motels.

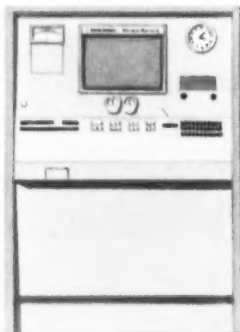
*Trademark





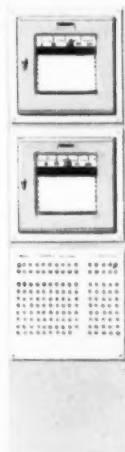
CENTRAL SELECTOGRAPHIC PANEL

Replaces system diagrams and floor plans that take up much of the area on present panels. The desired diagram or floor plan is flashed on one screen. At the same time console controls—single set of push buttons—are automatically switched to control the system in view. They provide precision temperature indication, logging and adjustment plus start and stop control of fans and positioning of dampers.



TEMPERATURE, HUMIDITY RECORDER

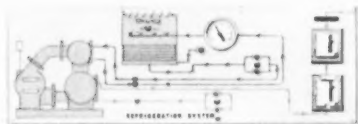
These recorders provide exact printed records of temperatures and humidity throughout the system. These records may be studied to determine over-all system efficiency. Through a plug and jack system one recorder can record up to 20 different measurements on a single chart. Points can be selected so that only those of interest at the time need be recorded.



MODULAR CONSTRUCTION, FLOOR PLAN AND SYSTEM PROJECTION MAKE CENTRALIZED CONTROL EASIER TO DESIGN, INSTALL, OPERATE

Now an air conditioning engineer can "see"
up to 50 separate fan system diagrams
and floor plans, read and adjust critical
temperatures throughout a multi-story building
...all at one small console.

In addition to the Selectographic projection feature, Honeywell's modular *building block* design brings new flexibility, new economy to centralized air conditioning controls. Starting with the basic unit—the central Selectographic Console—other modules of a standard 2' x 2' dimension may be added as the need arises or as the budget permits. Honeywell's Selectographic Supervisory DataCenter can be installed in buildings of all sizes, of all purposes—and grow with the structure itself.

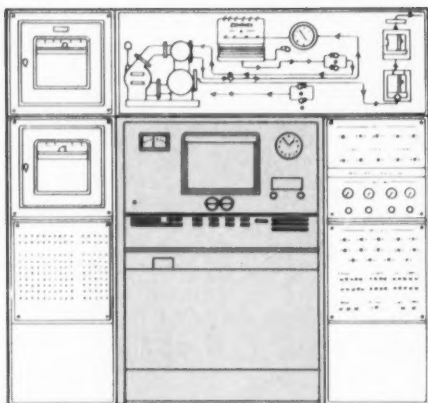


REFRIGERATION PANEL All major electrical accessories of refrigeration system can be started and stopped from this panel. Where the systems require it, the chilled water temperature can be controlled by a precision continuous recording controller in the chilled water supply line. A second controller may indicate and record system output in BTU's. The total BTU output is shown on a numerical counter which can be compared to the total electrical input shown on a similar counter to analyze system efficiency.



ALARM AND ANNUNCIATOR SECTION

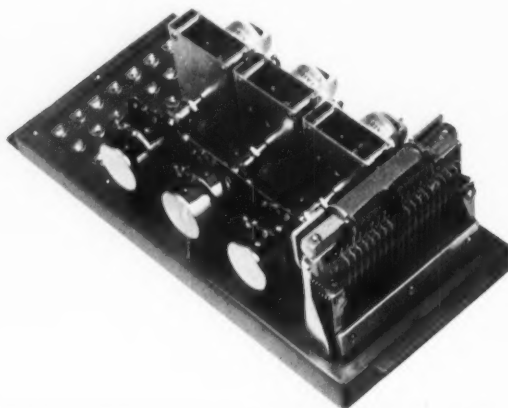
This module contains all air conditioning and refrigeration system alarm pilot lights and equipment operation pilot lights. In addition it may contain cold storage or special climate room limit alarms and other temperature, humidity, flow and pressure monitoring alarms as required.



NEW PROJECTION SYSTEM STORES ENTIRE BUILDING'S FLOOR PLAN IN CIRCULAR FILE OF 50 SLIDES READY FOR INSTANT SCANNING

The 50-slide projector is operated by pushing a button. Desired floor plan or system diagram shows on the screen; consoles of push buttons then are automatically switched to control that plan or system. One set of push buttons will cause the temperatures at the check points on the plan to

be indicated on the console. Simply pushing the proper increase or decrease button will adjust or reset one or all of the thermostats on the plan except those in private spaces. Pushing a similar set of buttons will start and stop all supply and exhaust fans; another set will position all dampers.



MULTIPLEX UNIT

The ability to control an entire system by one set of buttons is made possible by this Honeywell Multiplexer—a multipole bar relay energized by the same button as the projector. All temperature control points and sensing points are connected through this bar relay to the control buttons on the console. Wiring is simplified and substantially reduced.

MORE THAN 400 CONTROL CENTERS using the basic principles outlined here have given improved operating efficiency, better use of specialized manpower, longer equipment life, operational savings and more comfort to hospitals, schools, hotels, office and industrial buildings, banks, shopping centers and churches. A Honeywell control specialist

will be glad to work with architect or engineer even before blueprints are started. At this stage his knowledge will be most useful in designing and installing a system that will give the greatest possible satisfaction to all concerned. For more information send the coupon or call one of the 112 local Honeywell offices across the nation.

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AMERICAN 325-TON GANTRY CRANE SERVES NOXON RAPIDS POWERHOUSE

This 325-ton American Powerhouse Gantry Crane is installed at Noxon Rapids Dam in Montana for the Washington Water Power Company. One of the largest powerhouse cranes of its type, it spans 73 feet . . . has main girders 111 feet long. Specified and purchased by Ebasco Services Inc., of New York, consulting engineers on the project, the American crane provides ample capacity for all present and anticipated powerhouse

service at Noxon Rapids.

Unusual and specialized lifting and materials handling devices are custom designed, manufactured and installed by American Hoist Pacific Co. whose engineers have years of experience in this field. These qualified men are available for planning consultation at your request . . . you can rely on their assistance throughout the job—from drawing board to installation.

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From the Editor's Tranquil Tower

JUST AS THIS ISSUE reaches the readers, the Consulting Engineers Council is holding its Third Annual Meeting, in New York City. Under its past three presidents, John K. M. Pryke, of New York; Edward J. Wolff, of Chicago; and Charles C. Pate, of Tulsa, the Council has grown from a weak, poorly organized little group of 10 independent state and regional associations into a surprisingly strong federation of 20 associations representing almost a thousand firms of consulting engineers. In the three years the Council has also more than tripled its first budget (now about \$40,000) and expects to go up to \$60,000 or \$70,000 for the 1959-60 fiscal year. It has joined Engineers Joint Council, has a joint committee with the Producers' Council, is cooperating on a national level with the American Institute of Architects, and most important of all, is now a member of the International Federation of Consulting Engineers (FIDIC).

All these accomplishments represent increasing prestige and the opportunity to work to advantage with other important organizations. But the Council has done more than that. It has established close liaison with government offices in Washington and with such bodies as the International Bank for Reconstruction and Development.

The Council also has published an excellent brochure, *Framework for the Future*, that has been widely distributed among clients and potential clients. The Council successfully brought a halt to "free engineering" as practiced in some sectors by some manufacturers, and while the means have not always seemed mature (see Field Notes, page 158), the ends have been generally good. This lists but a few of the many accomplishments of the Council, and it deserves congratulations on its third birthday. Few other organizations have gone so far and done so much in so short a time.

The new president, Ralph M. Westcott, of Los Angeles, (who will be on the June cover) will find that there is still plenty left to do. The Council

has by no means grown up completely or come near solving all of its problems. There are still some associations among its membership who think they can get a \$1 million organization with two-bit dues. They are so accustomed to paying \$10 or \$25 dues to engineering societies that they cannot get used to the idea that a business association (as opposed to a technical or professional society) has fewer members but higher operating costs. President-elect Westcott has some ideas along this line, and they are good ones. He wants the Council to be supported by firms with actual participating membership by all principals of the firms. That is the right idea, and it will have to come. It will require a new dues formula, but Westcott is ready with that, too.

It also is going to be necessary for the Council to find some way for all the members of the Member Associations to participate more fully in Council affairs. The individual members need closer ties with the Council, which now is run almost autocratically by its board of directors. This means that the board is going to have to pay more attention to the wishes of the members back home and keep them better informed. At the same time, the board is growing larger and more unwieldy each year as more and more associations join the Council. This means it is going to have to turn over most of the actual operating authority to its executive committee. These two changes would demand that the board of directors be cast in a new role. It must begin to look upon itself as a representative assembly in which each representative thinks and speaks for himself but fully represents his association's members back home and keeps them informed and interested. But as a large representative assembly, the board must leave all but broad policy decisions to the executive committee.

If Ralph Westcott can lead the way toward that type of development for the Council in the year ahead, he will be performing a great service for all the members. If at the same time he can strengthen the national organization so that it becomes truly unified instead of being a federation of independent associations, he will have performed a miracle for the profession.

Westcott is a good man with a strong and enthusiastic personality. He will have good men to work with. Perhaps it can be done! ▲▲



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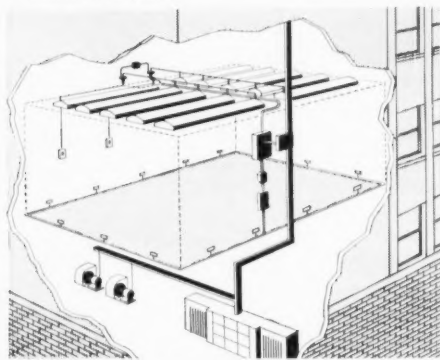
With the increased use of air conditioning, business machines, electronic equipment and higher-level area illumination, building services (and tenants) may suffer unless your power distribution system can satisfy growing load demands with stable power. Building or modernizing, you can solve this problem by specifying General Electric 480Y/277-volt* power distribution equipment. Here are two good reasons why—

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FOR MORE INFORMATION on General Electric 480Y/277-volt power distribution equipment, contact your nearest G-E Apparatus Sales Office or write for Bulletin GEA-6851. General Electric Co., Section 680-16, Schenectady 5, N. Y.

* Identical to 265/460Y.

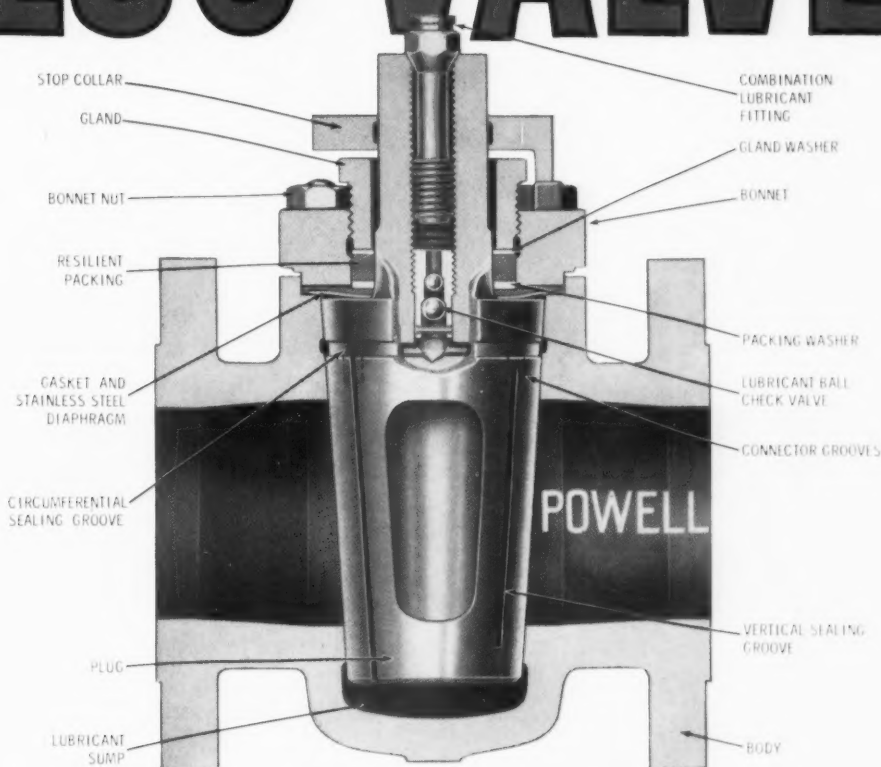


CUTAWAY shows basic loads—lighting, motors, general service—supplied by G-E 480Y/277-v equipment with fewer feeders, components than 208-volt system. Result: savings in space, equipment costs.

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Pounding traffic! Growing traffic volume! Greater and greater axle loads!

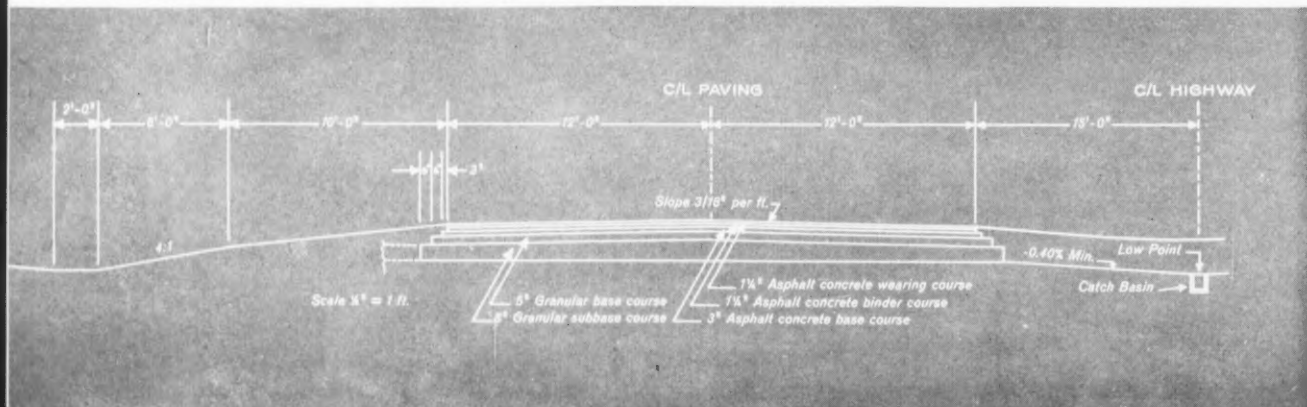
These assaults on pavement structures are **not** restricted to the 90-10 Interstate highways. They're common problems faced by engineers responsible for thousands on thousands of miles of road like

Ohio's new State Route 73... roads which are to be built largely out of State funds and wholly maintained with these monies.

In most terrain these roads... like your Interstate roads... should be Asphalt-paved. For many reasons! Perhaps the **most** important is that modern Asphalt

Typical of modern heavy-duty Asphalt sections is this one for Ohio's 5-mile State Route 73 between Middletown and Franklin. Median section is modified to a raised and curbed 15-foot section in urban areas. Pavement must support a heavy traffic

of trucks carrying steel, machine tools and other industrial products produced locally. Cost per sq yd for this Asphalt road \$3.03; \$2.00 per sq yd under the prevailing price for reinforced concrete.



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new Route 73 is Asphalt-paved

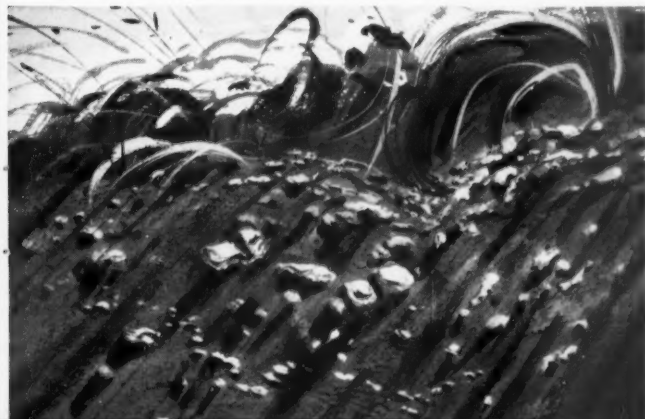
pavement structures are being built today to handle **any** desired loads with **any** desired built-in durability . . . **and these roads save money.** Cost less to build, less to maintain.

Your State can lay more road for the same money if you design for Asphalt concrete. More road means the traffic load on **all** pavements in your State can be kept at a maintenance-saving minimum.

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The Legal Aspect

MELVIN NORD, P.E.

Consultant in Legal and Technical Problems
Patent Attorney

The Law of Real Property: Land Contracts

IN PRINCIPLE, a land contract is simply a contract for the sale of real property. However, the term generally is used in a somewhat more limited sense—to mean a contract to sell real property. The purchaser takes immediate possession of the property, is entitled to its use and enjoyment, and makes payments over a period of time. Legal title to the property in the meantime is held by the seller.

Similar to a Mortgage

In a sense, this arrangement is similar to that which exists when a purchaser buys property and gives a mortgage back to the seller for the amount unpaid. In many respects, the legal situation that results is the same as with a mortgage, but in some respects it differs.

In another sense, a land contract is similar to a conditional sale of goods, since in both instances the purchaser takes possession while the seller reserves legal title until he is paid. However, the legal results are more intricate for land contracts, because we are dealing with real property instead of personal property.

The Purchaser's Interest

The land contract instrument is not, in form, a deed. It is a contract. Legal title is not conveyed by the instrument, but is expressly reserved to the seller. Legal title does not pass to the purchaser until

he has completed making the payments to the seller.

Nevertheless, for most purposes the purchaser is regarded as the beneficial owner of the property. He is the one who will be in possession and will be using it as if he were the owner. He is the one, in the absence of agreement to the contrary, who will be paying taxes on the property and paying for insurance. He is the one who will suffer a loss if the property is damaged or destroyed, or becomes depressed in value; and he is the one who has the principal opportunity of profiting if the value of the property increases (for example, if oil is found on the property).

Futhermore, since the contract is for the sale of real property, and real property is regarded in the law as unique (one piece of land being no substitute for another), the purchaser is entitled to specific performance of the contract. He thus can be quite certain that he will really get the title when he completes making payments, and not just damages for breach of the contract by the seller.

The Equitable Title

It is obvious that the purchaser has not merely a contract right in the ordinary sense, but an interest in the property itself. This interest is not the legal title, but is called the equitable title, since the equity court regards him as the beneficial

THE TRAFFIC PLAN

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A completely new idea for industrial lighting—a dual-role fixture. First, it delivers the higher footcandle ratings recommended by the Blackwell report . . . and maintains glare-free lighting at the working level.

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Both types banish ceiling shadows and provide comfortable shielding: 10% uplight with 13° cut-off or 25% uplight with 27° cut-off. For 430, 800 or 1500 M.A. operation. Designed for easy maintenance, too!

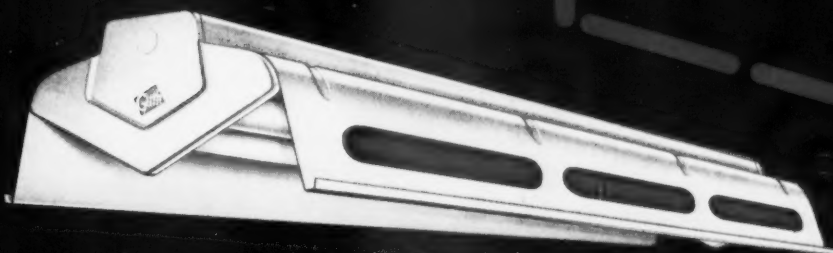
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standard porcelain
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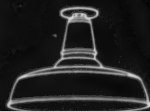
Green for **GO**
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Available in three reflector finishes—
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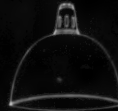
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30°, 60° and 90° High Bays
with or without uplight



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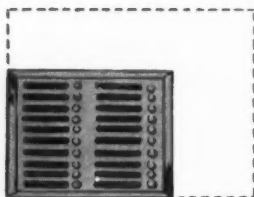


Mercury Vapor units
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MODULAR STAFF IN-AND-OUT REGISTERS

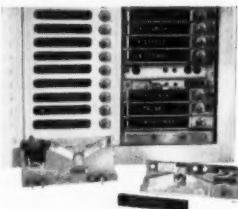
**AVAILABLE
IN ANY
HEIGHT-
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**REQUIRE LESS THAN
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WITHOUT SACRIFICING AREA FOR NAMES

Modular design makes Couch registers available in many name capacities and height-to-width ratios at competitive prices. Flexible grouping of unique plug-in name-tile units requires less than half the space used in other registers — without sacrifice to name area. Name tiles and long life lamps can be quickly changed by simply withdrawing the plug-in unit.



Couch's new modular staff in-and-out registers located at key points instantly indicate which staff members are in the hospital. Just a flip of a switch by a reporting member illuminates his name tile at all register locations, informing hospital personnel of his presence. When leaving the hospital, a switch operated at any register extinguishes his name tile at all registers. For hospitals with message centers, flashing name tiles (message indicators) may be incorporated.

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owner as soon as the contract is entered into.

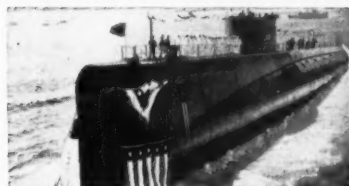
The equitable title is similar to the legal title in most respects. For example, if the purchaser dies before he has received title, the property nevertheless descends to his heirs as real property; it does not descend to those entitled to receive his personal property, as an ordinary contract right would. Thus, the purchaser's interest is converted by the equity court from a mere contract right (i.e., personal property) into a property interest in the land (i.e., real property). This is called equitable conversion.

Foreclosure

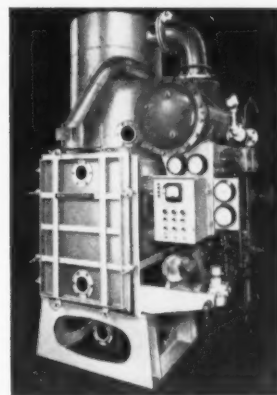
The purchaser's interest in the land contract normally cannot be cut off unilaterally by the seller, even in the event the purchaser has defaulted in his payments. He must foreclose the purchaser's equitable title, in a manner which actually is very similar to the foreclosure of a mortgage.

However, the purchaser's right can be cut off by the seller if he sells the property to a bona fide purchaser for value, without notice (actual or constructive) of the land contract. (This is inherent in the nature of all rights which are purely equitable, rather than legal.) This, however, is unlikely to occur. In the first place, the land contract can, in many jurisdictions, be recorded in the appropriate public office for recording deeds; this will make it impossible for anyone to be a purchaser without constructive notice of the existence of the land contract. And in the second place, if he physically occupies the land, this puts a purchaser "on inquiry" — he is held to have such notice as a reasonable person could obtain by making a reasonable inquiry. In the great majority of such cases, that is the same as notice of the existence of a land contract.

Therefore, for many purposes, the purchaser's interest in the property is the same as if he had



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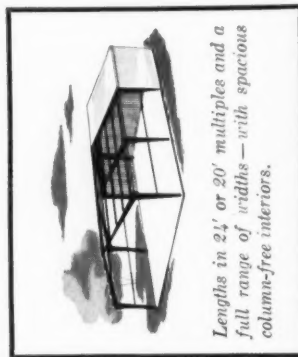
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obtained legal title and given a mortgage back to the seller for the amount unpaid. In the majority of jurisdictions, however, a mortgagee cannot cut off the mortgagor's interest in the property by sale to a bona fide purchaser for value without notice. In addition, the foreclosure proceedings generally are not identical with those involving mortgages.

The Seller's Interest

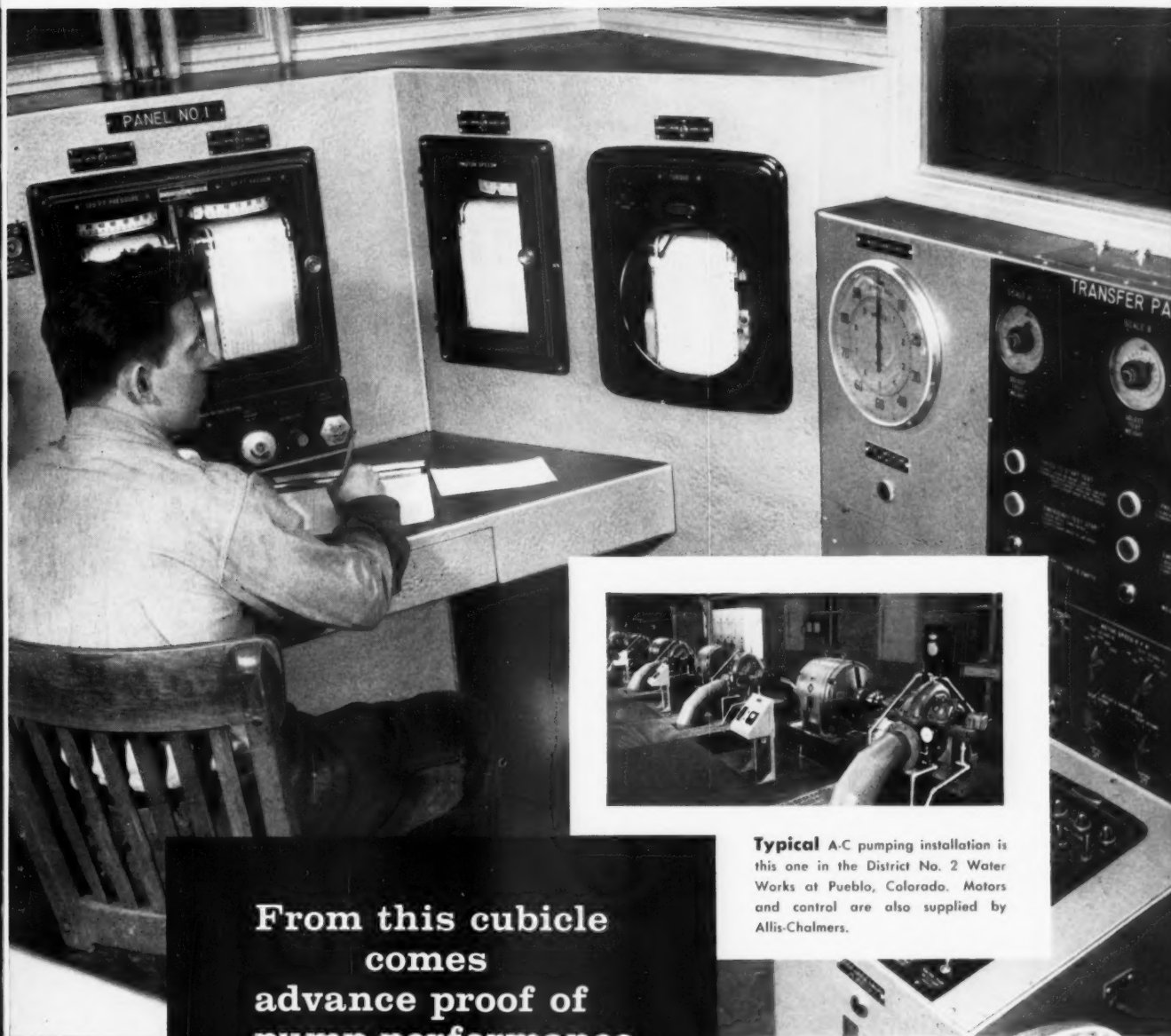
As previously indicated, under the doctrine of equitable conversion, the purchaser is regarded as the equitable owner of the realty. The seller is regarded, in equity, as holding the legal title in trust for the purchaser and for his own security, but he has no beneficial ownership interest in the property, in the absence of agreement to the contrary. His interest is converted by the equity court from a real property interest (ownership of land) into a personal property interest (the contractual right to receive the purchase price).

Thus, if the seller dies before he has conveyed legal title to the purchaser, his interest descends to those who are entitled to receive his personal property, rather than to the heirs who are to receive his real property.

Options to Purchase

To be distinguished from a land contract is an option to purchase real property. Assuming the option to have been given by the seller for a consideration given by the purchaser, the option is a contract. It also relates to land. Nevertheless, it is not a true land contract.

Thus, equitable conversion does not occur when the option is entered into. The purchaser is not the equitable owner as yet. However, if and when he exercises his option, making the purchase contract absolute, equitable conversion occurs. From then on, the purchaser is regarded as the equitable owner, and the seller holds the legal title in trust for him. ▲▲



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Typical A-C pumping installation is this one in the District No. 2 Water Works at Pueblo, Colorado. Motors and control are also supplied by Allis-Chalmers.

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full-line leader in meeting the pump needs of municipals. "Teamed" motors and control; customized standardization of parts and materials; engineering assistance and nationwide service are others.

Whatever your requirements in centrifugal pumps — from the smallest to 250,000-gpm giants — contact your A-C representative or distributor. Or write to Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.



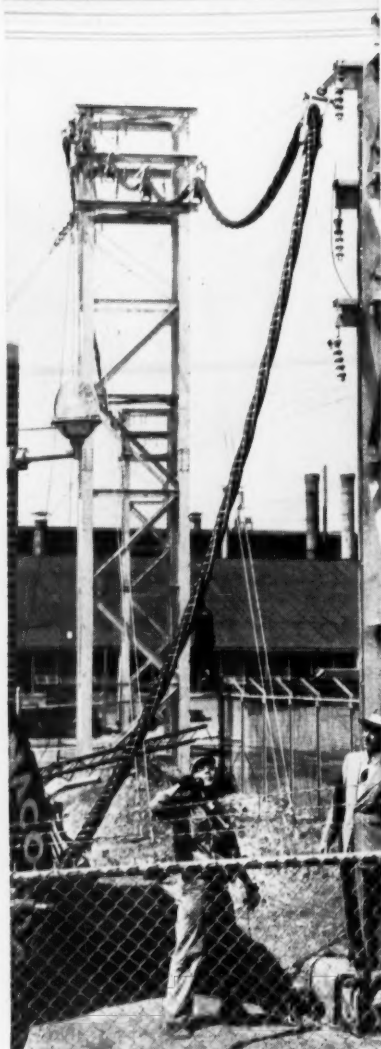
ALLIS-CHALMERS



A 5981-PW



Quickly installed aerial cable. Here's an application where 600-volt Durasheath was quickly installed and easily terminated. Durasheath's neoprene jacket resists weather, abrasion, heat, fumes. Assured: dependable performance and long-range economy!



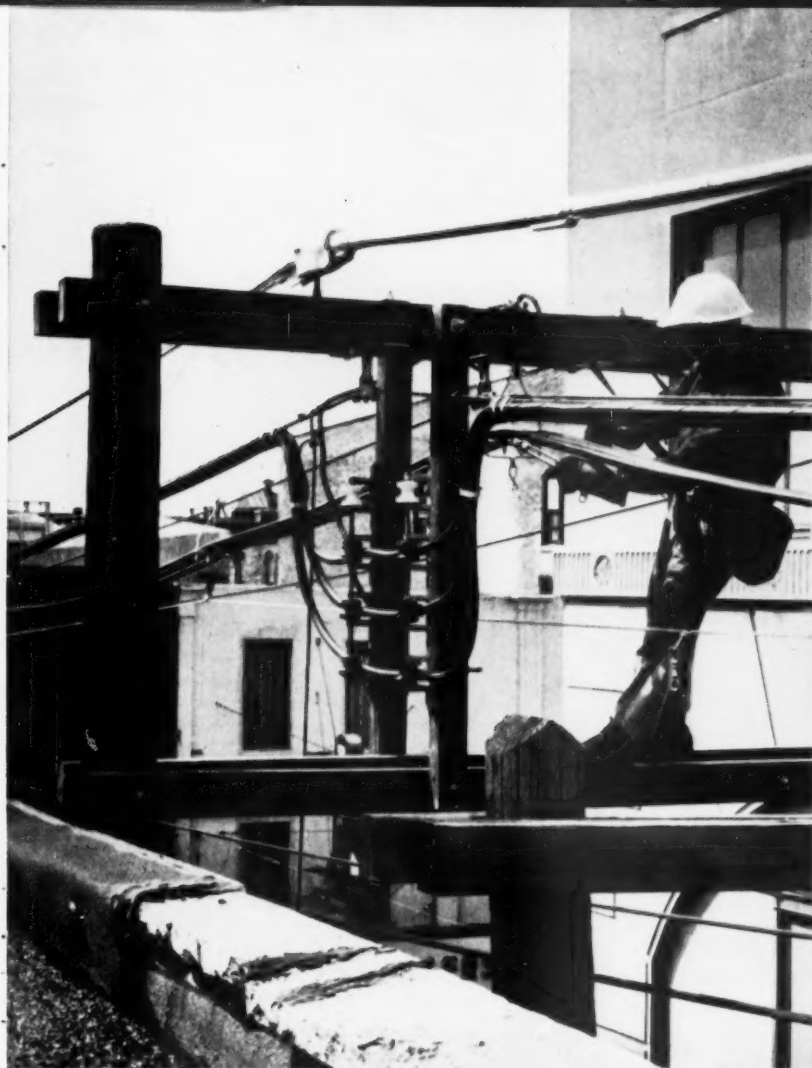
Factory-assembled aerial cable, made up of 3 single-conductor 15-kv Durasheath cables. Easy splicing, tapping and terminating meant simplified installation in the job shown here. No ducts, crossarms or insulators were needed. Wiring is neat, safe.



Direct-burial cable. The moisture-, oil-, and acid-resistance of Durasheath's jacket makes it the ideal cable for direct-in-the-ground applications like the one shown above. Its flexibility cuts installation time and cost because Durasheath is easy to handle. Its durability cuts maintenance costs!

Look at the ways you can save installation time and cost—with dependable Anaconda Durasheath Cable!

Wherever you want... whenever you want—this versatile power cable lets you install circuits fast... easily... at low cost! Use it aerially... in ducts... underground—in long runs with minimum splicing, indoors or out!



Field-assembled aerial cable. Versatile Anaconda Durasheath power cable was quickly field-assembled into aerial cable with the simple spinning operation shown here. Additional Durasheath was run along the building, grouped in a neat assembly by insulators and straps. It's another example of the way dependable Anaconda Durasheath adapts itself to your power cable needs—whether indoors, outdoors or both. Check into Anaconda Durasheath power cable for your wiring plans!



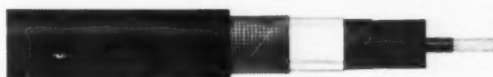
Installed in ducts. Durasheath's flexibility meant quick and easy installation here. And once installed, its tough neoprene jacket assures long, trouble-free life. Because Durasheath adapts itself to so many uses, your inventory problems are lessened—fewer cables need be carried in stock!

The installations shown above have one thing in common: they're all using Anaconda Durasheath* rubber-insulated neoprene-jacketed power cable—each for a different *kind* of application! Although the above photographs were taken at different installations, they could very well be pictures from one and the same job. Versatile Durasheath is a power cable that can be used to meet almost *any* installation need!

Such versatility in the use of Durasheath enables you to plan the most efficient layout for your wiring — then carry these plans through economically, with assurance of reliability. Talk to the Man from Anaconda about Durasheath. For full information, write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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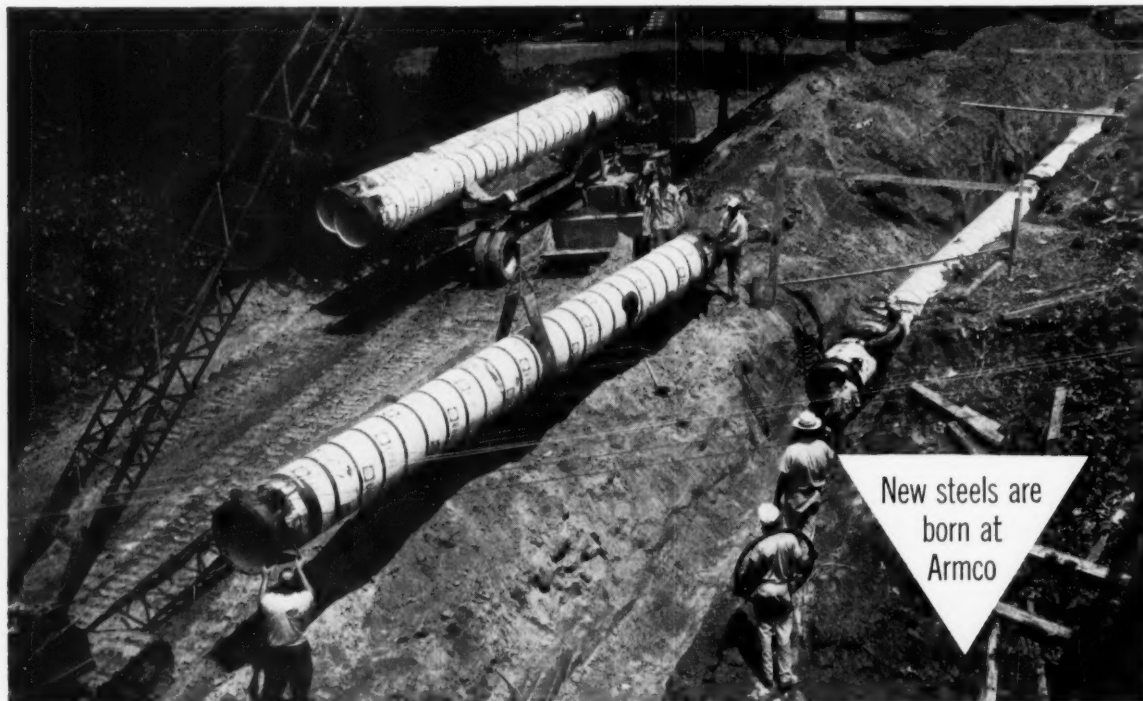


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For this Atlanta water line, lengths of Armco Pipe were joined by Dresser Couplings, with thrust lugs to take longitudinal thrust.

ARMCO DRAINAGE & METAL PRODUCTS



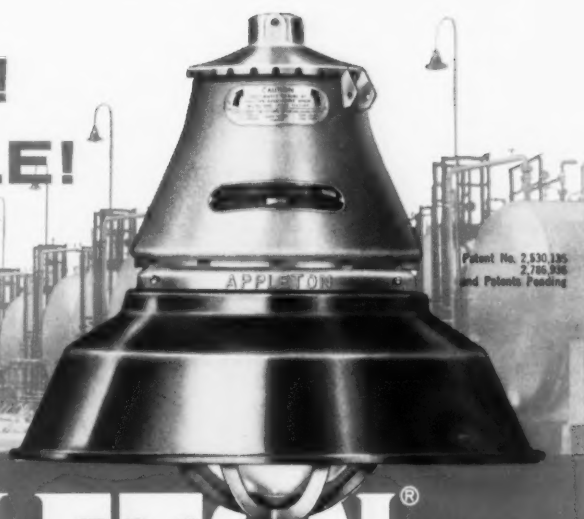
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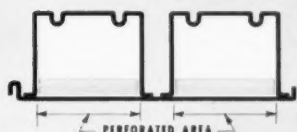
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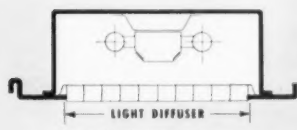
SECTION M1-OB

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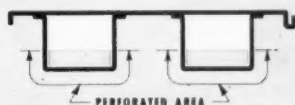
SECTION M2SR (Acoustical)

CEL-BEAM DEPTH 1½", 3", 4½", 6 or 7½"



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At Left: Cross Section of Long Span M-Deck
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Report from the West Coast

RALPH S. TORGERSON

West Coast Editorial Representative

CONSULTING ENGINEER associations on the West Coast are experiencing growing pains. The problem does not stem from an increase in membership but rather from a realization that the associations cannot remain at dead center. Activities must be expanded in the direction

of a well-organized and financed public relations program, closer cooperation in guarding against harmful legislation, and a strengthening of registration laws. The entire program hinges on the question of obtaining membership agreement on proposals that would require sub-

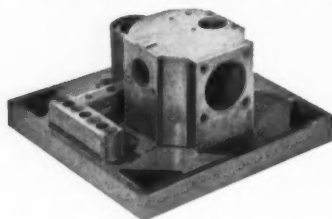
stantial increases in dues or substantial assessments.

Public Relations Plans

The Oregon association has voted favorably on a public relations program directed by professional counsel that would include forum-type television programs, establishment of scholarships, newspaper feature stories, news stories relative to engineering projects in the state, and the issuance of the CEC brochure and the CEAO directory. The cost of the entire program is estimated at \$4800, including the two scholarships at \$100 each. This program would supplement the CEC public relations program, which will be national in scope.

The California association also is exploring the idea of a public relations program, but has not formulated any definite plans. Handling the additional work probably would require augmentation of the present staff or the hiring of an outside professional public relations counsel. Here again finances are the principal problem. Although the California association's membership has risen to 210 and is expected to continue to increase substantially this year, the present dues structure does not provide adequate revenues to carry on expanded activities. Currently, the directors are studying a new dues for-

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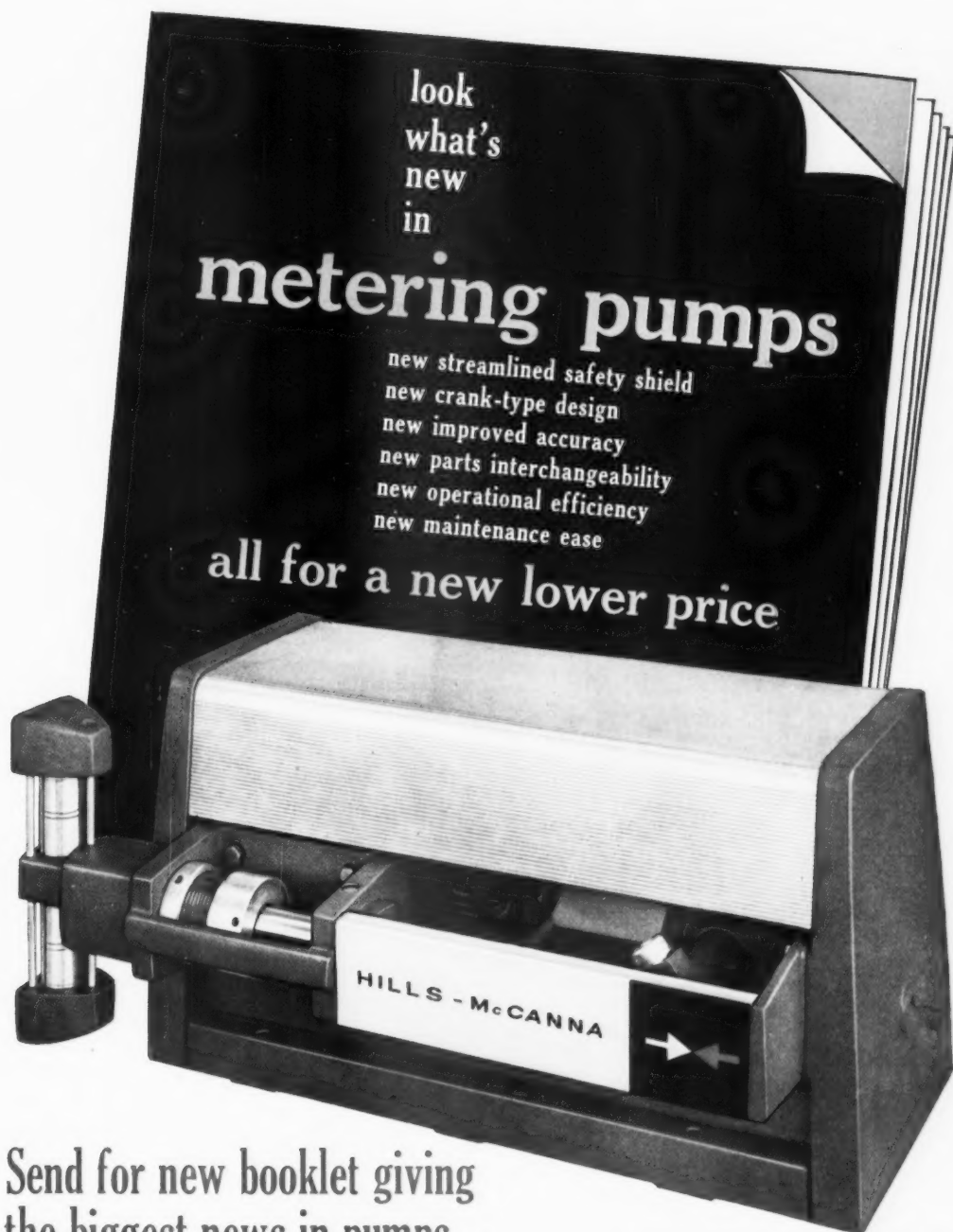
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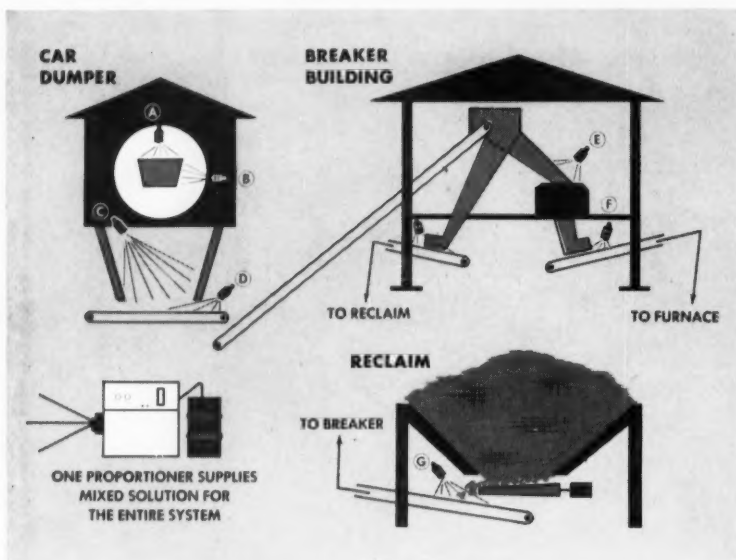
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mula that was proposed at the recent annual meeting.

Full Schedule

Recently CEAC President Blume appeared before a delegation of Japanese contractors and engineers to talk about earthquake-resistant design and construction. The meeting, arranged by the Associated General Contractors, was conducted like a United Nations meeting in that the Japanese, not understanding English, were supplied with microphones which conveyed to them the words of the Japanese interpreter. Questions posed by the Japanese in turn were translated into English by the interpreter and passed along to Blume.

Blume's talk was well received and undoubtedly will be remembered for a long time. In the afternoon, San Francisco was subjected to an earthquake of an intensity exceeding 5.00, the heaviest since 1956. Fortunately, no important damage was experienced.

The same day, Blume also presided at a CEAC luncheon meeting where legislation, bids on engineering work, and standards of performance were discussed. Pecos Calahan, executive secretary, reviewed pending bills before the California legislature, and Blume suggested that CEAC members should become better acquainted with the legislators in their districts. H. J. Brunnier urged engineers to become more civic-minded, and to cultivate friendships among those who may have a strong voice in legislative matters. He said that it is too late to contact legislators after a bill is presented for a vote.

Discuss Port Authority Bids

There was considerable discussion about the recent San Francisco Port Authority request for bids on engineering work. Originally, a letter was sent to consulting engineering firms by the Port Authority which was worded to convey the impression that it only sought proposals and an estimate of the cost



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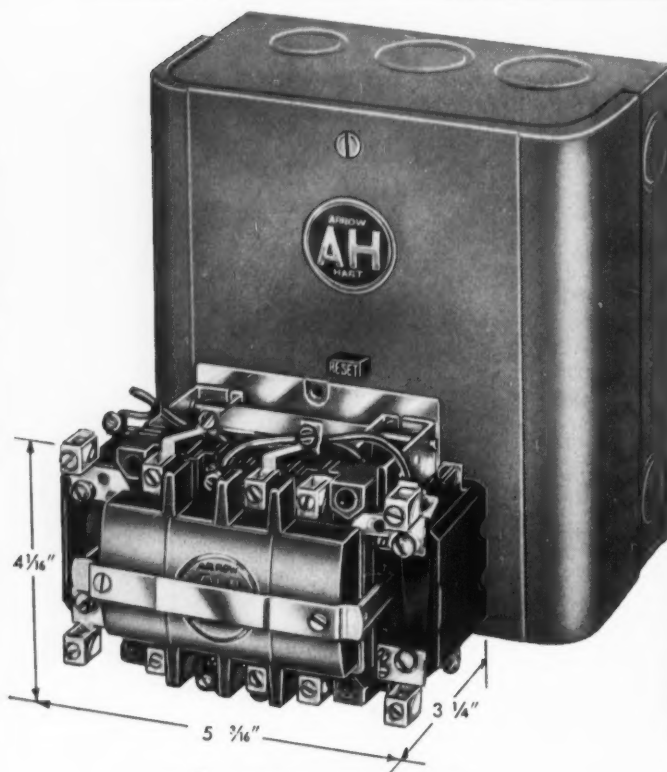


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of the work for budgetary purposes. One firm, believing that it was merely a request for proposals, outlined a complete scope of work and included an estimate of the cost based on the scope of work involved. The letter stated that it was not a firm figure and that it would have to be subject to negotiation. To its astonishment, this firm later learned that the Port Authority had sent out a request for bids based on the scope outlined in its letter which was copied word for word. This firm, of course, did not receive the request for bids but obtained a copy from another source.

Although the association lodged a protest with the Port Authority, it was unable to get any satisfaction. When local newspapers printed accounts of the award, using the term "bids" in their stories, the association again protested. One newspaper editor replied that in the public mind there is really no difference between the words "proposal" and "bid."

This experience serves to point up the danger of even submitting an estimate which is not to be considered a firm figure. It illustrates the need for educating public officials and the public in general about the proper procedure to be followed for negotiating contracts for engineering services.

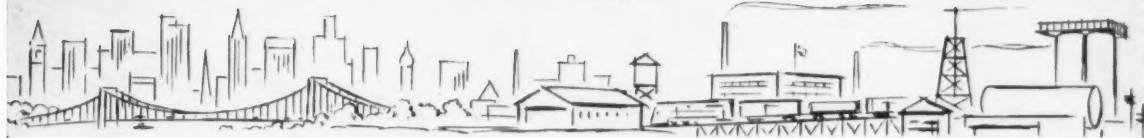
Minimum Standards

Electrical and mechanical engineers in the Bay area also were confronted with another problem in the form of a general indictment by the California Council, AIA, that their drawings and specifications were not adequate. As an example of the criticism by the architects, it was pointed out that many drawings showing piping layouts did not indicate pipe and duct size changes or transitions. Other complaints also dealt with detailing.

Some of the trouble undoubtedly stemmed from the fact that fees for electrical and mechanical engineering in this area were too low on many projects, a condition at

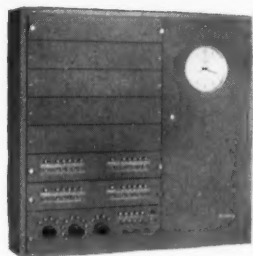
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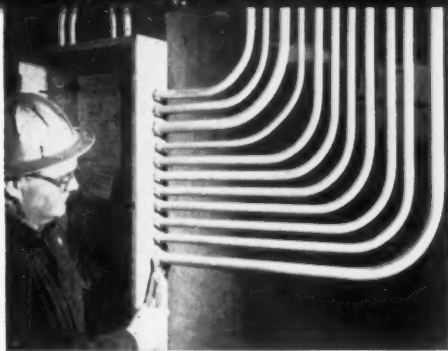
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least partly attributable to the architects themselves. Their taking of architectural contracts at inadequate fees has contributed to the squeeze brought to bear on engineers in interprofessional practice.

However, from a professional standpoint, inadequate performance standards cannot be condoned. CEAC decided to do something about the situation and co-operated in setting up the Construction Liaison Committee of California. In addition to representatives of CEAC and the California Council, AIA, the committee has representatives from the Associated Plumbing Contractors of California; Mechanical Contractors Association of Northern California, Inc.; National Electrical Contractors Association, California-Nevada Conference; Sheet Metal, Heating, and Air Conditioning Contractors Association of Northern California, Inc.; and the Structural Engineers Association of Northern California.

After many conferences, the committee presented a report entitled, "Minimum Standards of Performance for the Design, Selection, and Installation of Mechanical and Electrical Work in Buildings." It is divided into three sections: Section I covers minimum standards for the design professions (mechanical and electrical engineering); Section II, minimum standards for construction trades; and Section III, a suggested division of work among specification sections. While the standards originally were set up for application in Northern California, they now are generally accepted on a state-wide basis.

The first paragraph of Section I summarizes the basic objectives of the minimum standards. It reads, "The fundamental requirement is that drawings and specifications be complete, detailed and accurate enough so that all bidders may prepare estimates on exactly the same work and so that construction may proceed with no misunderstanding on the work to be done." Considerable care was exercised to eliminate



At Detroit's Pavilion Apartments, Youngstown "Buckeye" Conduit is being attached to electrical control box.

Accent on Excellence

Youngstown "Buckeye" steel conduit

Detroit's new, modern-as-tomorrow Pavilion Apartments, designed by architect Mies Van Der Rohe, has lifetime electrical wiring protection — thanks to Youngstown "Buckeye" Rigid Steel Conduit.

Electrical systems that function improperly are a bad investment. To be sure your installations are both safe and efficient, always specify "Buckeye" Conduit. It's been the consistent choice of leading architects, contractors and building owners over the years.

When you specify "Buckeye" Conduit, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create electrical wiring systems with an "accent on excellence".

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ARCHITECT:

Mies Van Der Rohe, F.A.I.A.,
Chicago, Illinois

GENERAL CONTRACTOR:

Herbert Construction Corp.,
Chicago, Illinois

CONSULTING ENGINEER:

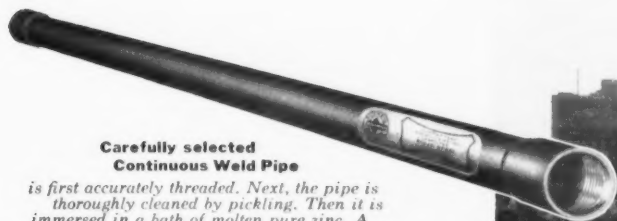
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is first accurately threaded. Next, the pipe is thoroughly cleaned by pickling. Then it is immersed in a bath of molten pure zinc. A special process is used to remove it from this bath so that a clean, smooth zinc coating remains on both inside and outside. Then a coating of tough, transparent lacquer is baked on both inside and outside surfaces, providing a smooth raceway through which wires may be easily fished. This is Youngstown's long-lasting, trouble-free, easy bending hot galvanized Buckeye Conduit.



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any reference to labor agreements over work to be done. However, the report does indicate suggested allocations among specification groups in Section III.

The committee working up the minimum standards drew upon the experience of consulting engineers in many states, particular those in Illinois who faced a similar problem. In turn, it has offered to supply details of its work to other engineers interested in the problem. Copies of the standards can be obtained from J. D. Mack, secretary, 785 Market Street, Room 1404, San Francisco 3, California.

To implement the minimum standards and to serve as a continuing body to make investigations and recommendations, a special committee of electrical and mechanical engineers was appointed under CEAC auspices to include both members and nonmembers. Committee members include: Thomas R. Simonson, of G. M. Simonson, San Francisco, chairman; Francis E. Adams, Los Gatos; Dudley Deane, Dudley Deane and Associates, San Francisco, ex-officio member; Robert B. Earl, Earl and Gropp, San Francisco; G. L. Gendler, Berkeley; Gerald Kasin, San Francisco; and Daniel Yanow, San Francisco. Committee member alternates include: Jos. Murray; Kenward S. Oliphant; Lyle E. Patton; Glenn W. Smith, Smith and Garthorne; Sam Vandament, Vandament and Darmsted; and Frederick V. Weir—all of San Francisco. Membership on the committee is equally divided between mechanical and electrical engineers.

Other Joint Committees

In the Los Angeles area, a group of electrical engineers composed of both CEAC members and nonmembers has been functioning in an informal way. The purpose of this group, which has been holding monthly or more frequent meetings as necessary, is to consider problems involving ethical conduct, fees, and standards of the profes-

When It Comes to Humidification...

Here is some information to consider:

The great reduction in moisture content of hygroscopic materials caused by dry air in the plant during the heating season drastically affects the qualities, dimensions, workability and weight of these materials.

Similarly, office efficiency is affected by dry air. Business machine operations in dry air can be a problem due to static electricity. Health and comfort of personnel is adversely affected by dry air.

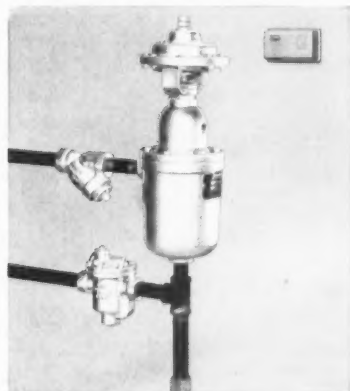
The operation of certain types of production machinery, manufacture of explosives and flammable chemicals, plastic film handling, anesthetic areas in hospitals are subject to severe problems of static electricity under dry air conditions that may cause inefficiency and/or hazard.

The obvious answer is to specify automatic controlled humidification.

The use of dry steam is very often the simplest way to humidify.

Advantages of Steam Humidification

1. Steam is ready-made vapor which merely has to be mixed with air in the duct system or discharged to the humidified area.
2. Steam is pure water vapor—no mineral dust as comes from evaporated water droplets.
3. Steam may be shut off immediately when control is satisfied.
4. Steam comes on immediately when control calls for humidity.



AM-32 Air-Modulating Humidifier complete with strainer, trap and hygostat. AM-33 similar.

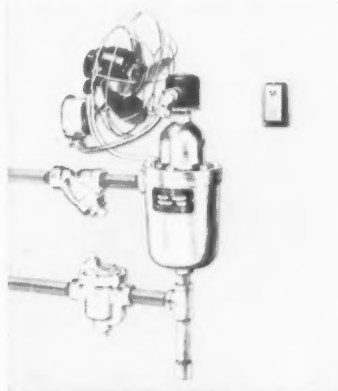
5. Duct system and air handling units are always dry. Thus, there is no odor, no growth of algae or bacteria, no corrosion problems.

Armstrong Steam Humidifiers are scientifically designed, automatically controlled steam valves for admitting steam vapor to the humidified area, either directly or into the air stream in ducts or plenums. The humidifiers dry the steam and muffle the noise of the discharge.

Thousands of Armstrong units are used successfully in industries working with hygroscopic materials, in offices, plants and institutions for improving health and comfort conditions and in offices, plants and institutions for control of static electricity. Every installation is backed by a sales and service network that blankets the United States and Canada.

Advantages of Armstrong Humidifiers

- 1—Low cost and large capacity.
- 2—Minimum maintenance, proved by thousands of installations.
- 3—Quiet operation.
- 4—No carry-over or drip.
- 5—Immediate response to control.
- 6—Low operating expense.
- 7—Guaranteed tabulated capacities.
- 8—Selection is simple and easy.
- 9—Small space required makes duct design easy.
- 10—Easy installation.



CL-2 Humidifier complete with fan and motor, humidistat, fine mesh strainer and trap. CL-3 similar.

Models Available, List Prices, Capacity Range

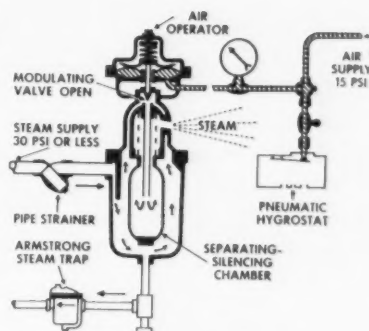
Air-Operated Units

Model	List Price	Capacity, lb./hr.
AM-32	229.25	31 to 150
AM-33	316.00	60 to 320
DA-34	593.00	145 to 1425

Electric Units

Model	List Price	Capacity, lb./hr.
CL-2	170.00	25 to 76
CL-3	295.00	60 to 170
CK-4	545.00	145 to 1280

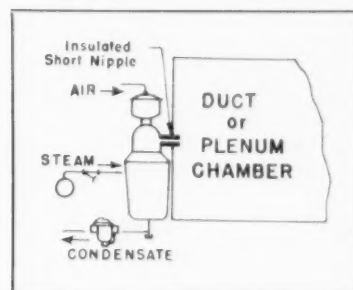
Models DA-34 and CK-4 are high capacity units for use with large floor type unit heaters or in large ducts or plenum chambers.



HOW THEY WORK

Air-Operated Units—When relative humidity drops slightly below desired level, the pneumatic hygostat increases air pressure in operator to open modulating valve in proportion to demand. When demand is satisfied air bleed closes the valve. Air-operated units usually discharge to ducts or are installed in plenums.

Electric Units—When relative humidity drops slightly below desired level, humidistat energizes solenoid to open steam valve and start fan. Steam flows through muffler to atmosphere and is dispersed by fan. When desired humidity is reached, humidistat closes valve and stops fan. Electrically operated units normally discharge directly into atmosphere.



Typical installation of Armstrong Humidifier discharging dry steam to ventilating air duct.

For Complete Information

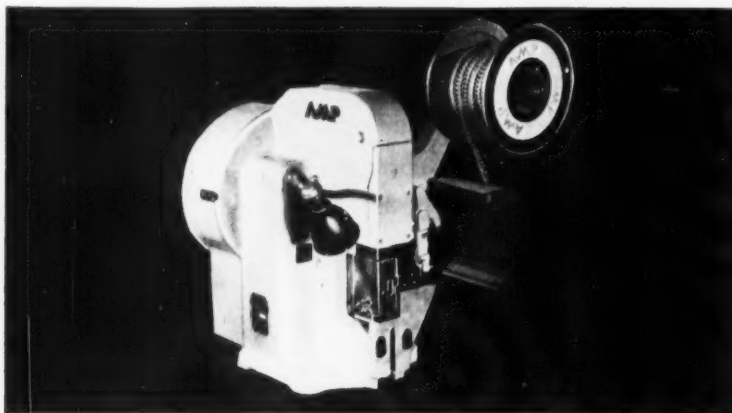
SIXTEEN-PAGE BULLETIN NO. 500 contains a wealth of information about humidification. Tells: how relative humidity affects products and profits . . . other effects of relative humidity . . . recommended humidities for various operations . . . advantages of Armstrong Steam Humidifiers . . . how present users have profited . . . complete data and prices on all Armstrong humidifiers . . . selection and installation data. To get your copy, just call your local Armstrong Representative or write

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sion. While not officially sponsored by CEAC, the association already has profited. As Foster Sampson pointed out at the annual convention of CEAC, the group meetings in Los Angeles have brought new members into CEAC, as a result of nonmembers learning of the benefits of membership.

As CEAC membership grows, other groups with common interests may be formed to consider special problems. It even has been suggested that structural engineers may desire to set up such a group, despite their current support of the structural engineering associations.

CEAW Battles Incorporation

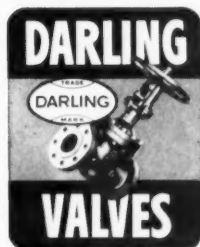
Paul H. Issac, secretary of the Consulting Engineers Association of Washington, reports that CEAW, which is opposed to corporate practice, was very disappointed by recent actions in the state legislature. Two bills amending the engineering legislation law were submitted in the Senate: SB 127 permitting corporate practice was sponsored by the Washington Society of Professional Engineers with the backing of the Committee on Engineering Laws; and SB 353 opposing corporate practice was sponsored by the Professional Engineers Legislative Committee made up of representatives of the Consulting Engineers Association of Washington and other local engineering societies, including the Puget Sound Engineering Council.

The bill permitting corporate practice was reported out of the Senate committee and was hastily passed by the Senate, being advanced to third reading immediately after second reading. These actions were taken despite strong objections to the bill by most local societies and numerous individual engineers at hearings while the bill was in committee.

Efforts exerted by the societies in the House were more effective, but still failed. The bill finally was reported out very late in the session. On third reading, amendments pre-



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AFFILIATE: Conco Building Products, Inc. — Brick, Tile, Stone

pared by CEAW were proposed and accepted by the House. These amendments would have provided a true "grandfather clause" permitting only those corporations presently practicing in Washington to continue to do so and setting December 31, 1961 as a termination date for such practice, meanwhile referring the bill to the legislative council for study. This was an effort at compromise that would have been agreeable to CEAW.

However, the bill then was placed in the hands of a free conference committee of the two houses and again modified. As a result, Washington's requirements for corporate practice, when this law becomes effective in 90 days, will be approximately the same as those of the other 36 states in which such practice is permitted. The only requirement for practice of engineering by a corporation is that a registered engineer be designated as being in charge of the practice of engineering and that the corporation obtain a certificate of authority to practice from the State Board of Engineering Registration. The only unusual feature of the new law is that the legislature set a termination date for December 31, 1961. Presumably there will be an effort in the next session of the legislature to make the law permanent, but this does give those who oppose corporate practice another chance, too.

The Governor of Washington permitted the bill to become law without signing it or vetoing any portion of it. However, those opposing corporate practice are now supporting a referendum petition. If they can get about 45,000 signatures by June 10, the law will have to be put before the voters in the 1960 elections.

All in all, it is quite a fight. The Washington Society of Professional Engineers and the Committee on Engineering Laws have a victory if only a temporary one, but the fight is being renewed from every conceivable front. ▲▲

Architect-Engineer & Contractor see for themselves . . .

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U.S. Patent Ser. No. 574-765. Other patents in application U.S. and foreign countries.

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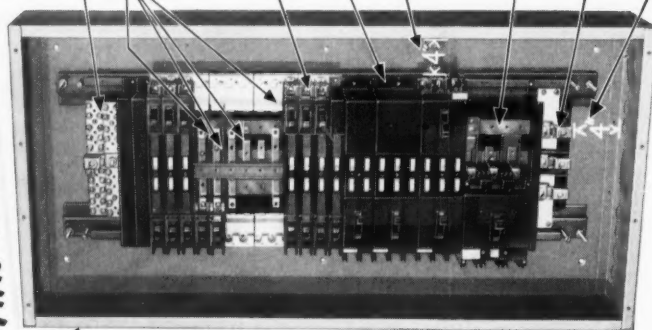
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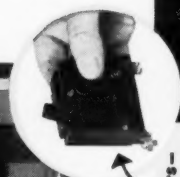
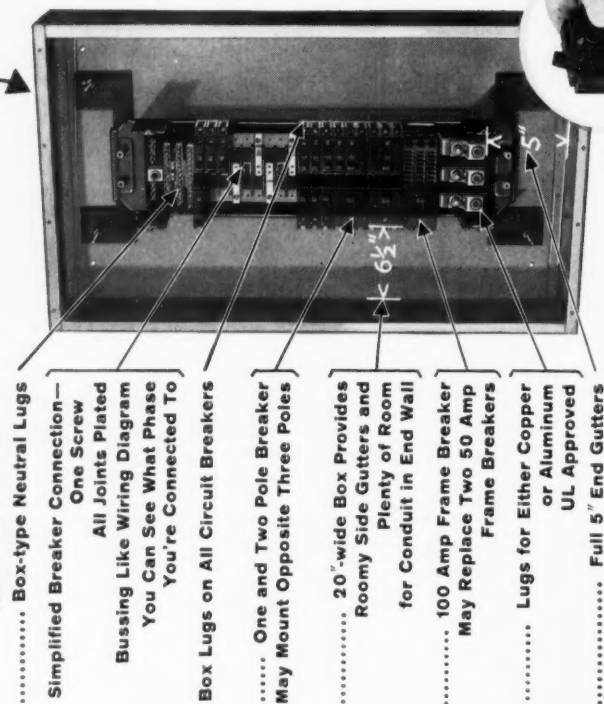
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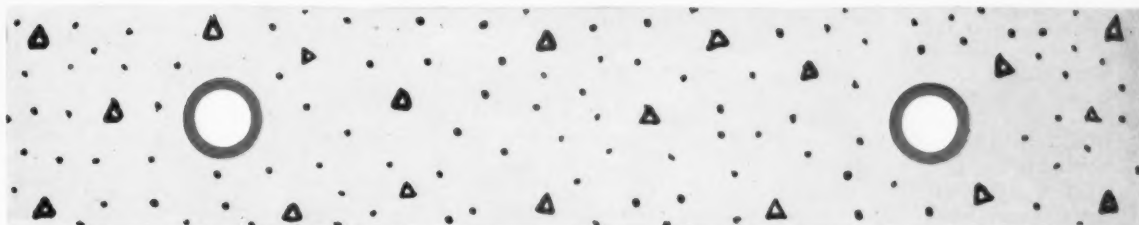
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PIPE: THE MOST IMPORTANT SINGLE COMPONENT—Pipe for snow melting and radiant heating systems *must* resist corrosion. It is only accessible for repairs at considerable cost and inconvenience. Any leaks that might result are frequently difficult to locate with any accuracy. It is also virtually impossible to avoid some rough handling during the course of fabricating and installing such systems. So, strength is another piping must.

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SUITABILITY OF 4-D WROUGHT IRON—4-D Wrought Iron is corrosion-resistant, strong, compatible with structural materials over wide temperature ranges, and easy to fabricate. There is *no* "or equal." Historically, the *first* snow melting system in the U.S. was Wrought Iron: designed 34 years ago for Rochester Gas & Electric Corporation, Rochester, N. Y. No failures, ever. The *first* radiant heating system in the U.S. was likewise Wrought Iron: designed in 1938 for Frank Lloyd Wright's famed S. C. Johnson & Son Office Building in Racine, Wisconsin.



BYERS 4-D WROUGHT IRON

Things to Think About in Selecting Sidewall Diffusers

...aspiration, aspect ratio, noise levels, smudging, and other factors

A sidewall diffuser has three basic functions to perform:

1. Attractively cover the duct opening in the wall.
2. Impart direction to air flow.
3. Diffuse the conditioned air thoroughly and rapidly before it reaches the occupancy zone.

If a "diffuser" doesn't truly diffuse, it can drop a solid mass of cold air onto occupants of the room. One way to get around this problem is to direct the air flow from the diffuser toward an unoccupied area of the room. Another method is to use ceiling diffusers even when sidewall diffusers would be easier and more economical to install. Neither solution is ideal.

The Answer

Barber-Colman Uni-Flo sidewall diffusers provide an efficient answer to the problem. They provide very thorough aspiration. A turbulence is created which keeps the cooled air above the occupancy zone for the full length of throw. Conditioned air literally "trickles" into the room. Rapid warmup is secured. There is no mass of cold air to disturb human comfort.

The requirements outlined in this quote are from Heating, Ventilating, Air Conditioning Guide, '58, chap. 30: "The air discharged from a wall outlet should not reach the occupied zone until the velocity has fallen to about 50 fpm. Therefore, the outlets should be located high enough for the air stream at the termination of throw to be not less than five or six feet above floor level. Or, in other words, the

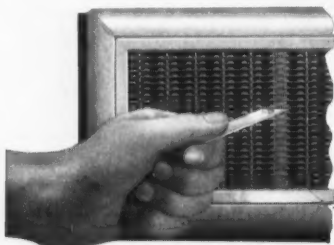


Fig. 2 Barber-Colman Uni-Flo Sidewall Diffuser—Note grille design which creates controlled air turbulence for complete aspiration.

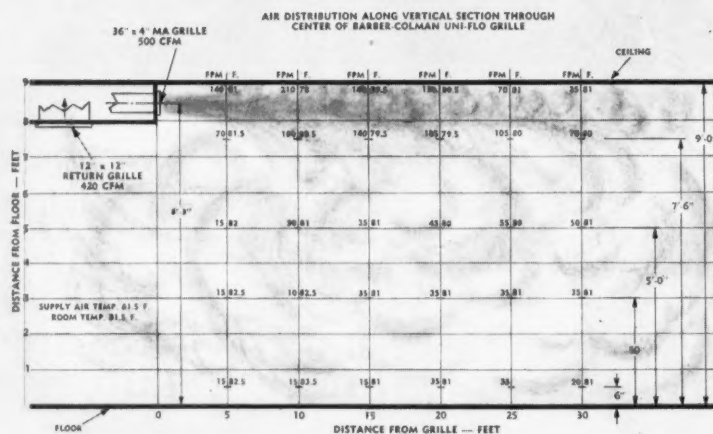


Fig. 1 Uni-Flo Grille Traverse—This charts the results you can predict and deliver with Uni-Flo grilles. Only Uni-Flo grilles are true sidewall diffusers guaranteed to perform in accordance with the published data.

drop should not be more than the difference between mounting height and zone of occupancy."

It is almost impossible to meet this requirement in a low-ceilinged (9 ft) room without the aspiration provided by Barber-Colman Uni-Flo sidewall diffusers.

Fig. 2 shows how the grille of the Barber-Colman Uni-Flo sidewall diffuser is designed to create air turbulence. This is in direct contradiction to the theory of using "air foil" sections (which create a laminar flow which tends to defeat aspiration and to drop air into the occupancy zone as discussed above).

There is another very nice feature about the Uni-Flo grille design. Not only does it provide for adjustment of horizontal flow, it also provides controlled adjustment in vertical planes. This permits you to steer the air past any obstacles in front of the grille.

Noise Levels

The effect upon noise level of the air turbulence created by Uni-Flo sidewall diffusers is sometimes asked about. Page 7 of Barber-Colman "Grille Engineering Data" contains a listing of noise levels for various air patterns. These figures speak for themselves, showing that there is no noise problem. Incidentally, Barber-

Colman offers the most complete diffuser noise level data available, including the effect of dampers in various positions.

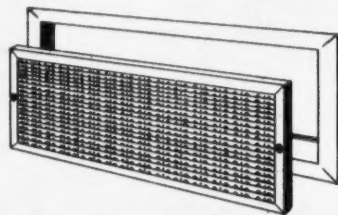


Fig. 4 Removable cores—to simplify installation and maintenance and contribute to good housekeeping.

Aspect Ratio

The aspect ratio of Uni-Flo grilles has a very definite effect on their performance, even though aspect ratio may not matter with other types of diffusers. It assists the excellent aspiration achieved by Uni-Flo diffusers and, therefore, assures more even air distribution throughout the room.

Another feature of Uni-Flo grilles is the removable core which contributes to good housekeeping. The core can be removed without damaging the paint seal around the frame. Also, electroplated cores are available (in

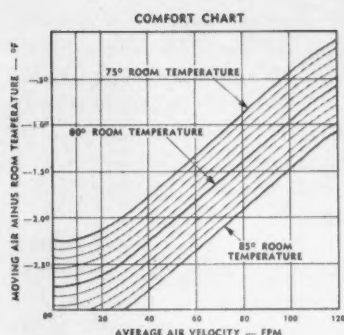


Fig. 3 Barber-Colman Comfort Chart — Here are the conditions of air movement and temperature in the occupancy zone that are required for human comfort standards. All points below the line represent uncomfortable conditions, while those above the line fulfill the requirements. You get required performance with Barber-Colman Uni-Flo sidewall diffusers.

which case the frames are painted to match the wall). Electroplated cores are less conspicuous and more durable and can be easily cleaned.

Accessories

Simple, positive, tamperproof adjustment of the air volume for easy system balancing is provided by the optional Uni-Flo opposed-blade volume control. Although normally key-operated, this can be furnished with an operating knob. Its opposed-blade design prevents any shifting in the damper setting. Deflectrols — factory-assembled deflecting vanes — attached to the rear of the diffuser provide uniform distribution across the diffuser face.

Performance

Barber-Colman diffusers will meet the following specification:

Sidewall and/or ceiling air distribution grilles and diffusers will diffuse air uniformly throughout the conditioned space, but at no point in the occupancy zone will the air velocity exceed 30 fpm at a temperature more than 2° F below the average room temperature or 75 fpm at a temperature more than 1½° F below the average room temperature.

Engineering Data Catalog No. F-4051-2 gives complete information, including 50 pages of selection data which provides all of the information necessary for even the most difficult jobs. Call your local Barber-Colman office or write to:



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MAY 1959



Heard Around Headquarters

NEW YORK CITY'S COMPTROLLER, Lawrence E. Gerosa, made some headline-getting accusations of waste and poor planning in school construction and design (January 1959, page 46) early this year.

Gerosa detailed his charges, and then a Professional Advisory Committee, representing the New York Association of Consulting Engineers and the New York Chapter of the American Institute of Architects, detailed an answer to these charges.

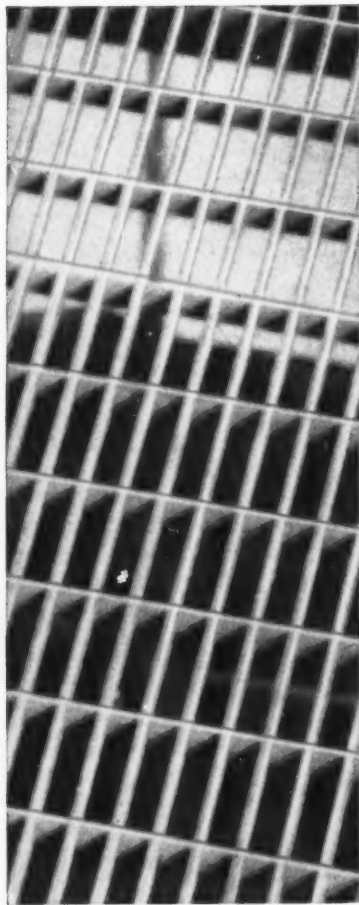
Gerosa had complained that fees paid by the Board of Education to architects (and engineers) are higher by 25 percent than fees paid by other city agencies. The Professional Committee members, with Darl H. Hunt and William Eipel speaking for the engineers, did not agree:

"In 1957 engineering offices doing work in connection with city schools analyzed their costs on these jobs and established a basis of fees that the New York Association of Consulting Engineers now recommends for such work; these would amount in the aggregate to about 38 percent of the 1958 architectural fees — a larger share than heretofore received by the engineers. This constitutes evidence that the architect's fee should not be decreased but rather increased.

The architects have now initiated a similar analysis of their costs with a view to future negotiations between the architectural profession and the parties concerned.

"Meanwhile, it is understood that a fee schedule has been discussed and crystallized between representatives of the Bureau of the Budget, the Comptroller's Office, and the Bureau of Construction of the Board of Education. This schedule has not been made public, but is understood to establish a single uniform rate equal to the rate paid by the Department of Public Works of New York State for similar work. The new schedule proposed for New York City schools would represent a still further reduction of fees from those effective in connection with current jobs, except where special circumstances warrant exceptions. . . . It seems doubtful whether, under it, the Bureau of Construction will be able to obtain the services of first class architects and engineers familiar with school construction, as it has heretofore done. Without the stimulation from experiences and original outside architects, the quality of design of new N.Y.C. schools might tend toward mediocrity."

Current New York City school fees for re-use of plans are approximately 40 percent of the fee paid



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Hendrick Mitco . . . the grating with the Deep Cross Bar

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for the original. Gerosa called this exorbitant, and suggested one-half or one percent as a better fee.

The Committee explained that adapting plans to a new site is not as easy as it sounds, detailing for Gerosa just what is involved (such as new foundation plans, modification of mechanical plans for utilities, etc.)

The Professional Committee said the current fees "are not out of line for such services," and pointed out that if the Board of Education wanted to, it could adapt the plans.

Gerosa stressed that the Bureau of Construction handles supervision. The Professional Committee explained that "about one-half of the work which comes under the heading of supervision under normal jobs still is required under Board of Education contracts; namely, checking of shop drawings . . . etc., together with being available for consultation at the job when required. The later service may or may not be substantial, depending on the initiative and intelligence of the Bureau's representative on any given job."

The Comptroller had listed 34 new schools built from re-used plans out of a total of 127 new buildings. He wanted more re-use. The Committee termed the present re-use "a remarkably high performance under the conditions to be expected in New York City."

However, the Committee explained that during the past few years many new arrangements (some as a result of pressure from the educational authorities) have been designed.

Gerosa was cautioned against expecting to save large sums in addition to the architectural and engineering fees. "There is no ground for believing that contractors would bid lower on re-used plans than on original plans; in fact, the contrary might be the case."

The Comptroller's figures on extras were questioned. "The Comptroller's detailed figures of potential savings which might have

been realized in connection with particular projects are hardly justified—particularly when he adds all potential savings together, whereas only some might be realized in any given building, and in consequence others might be impossible to realize. There seems little justification for the Comptroller's statement that \$100 million might have been saved."

It was conceded, however, that important savings might result from avoiding excessively extended plans and wings, excessive use of metal-and-glass, metal-and-panel skin-wall, or glass construction.

As to a comparison of private vs. city design, the committee said "there is reason to believe that the cost to the City of plans and specifications produced by private architects (and engineers) is substantially less than the cost of similar plans produced by the Bureau."

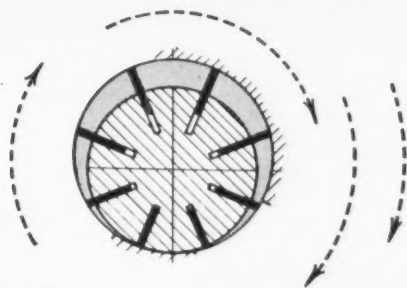
The report continued . . . "In his news release of February 10, 1959, the Comptroller stated that arithmetic is the sole subject of debate in connection with the cost of construction on New York City Schools. This is certainly not true. The question concerns values.

"Value is not measured by initial cost of construction alone, but by long range cost, with consideration of fitness for the educational program, construction cost, durability, and continuing maintenance costs. Value also involves esthetic qualities."

As to suggestions, the Committee said "The most important first step would seem to be better coordination among the various departments of the Board of Education in order to improve:

- (a) Accurate determination of educational and community needs, over-all and in detail.
- (b) Better methods of choice and purchase of sites.
- (c) Emphasis on principles of sound, economical planning and construction.
- (d) Better coordination between the Director of School Planning,

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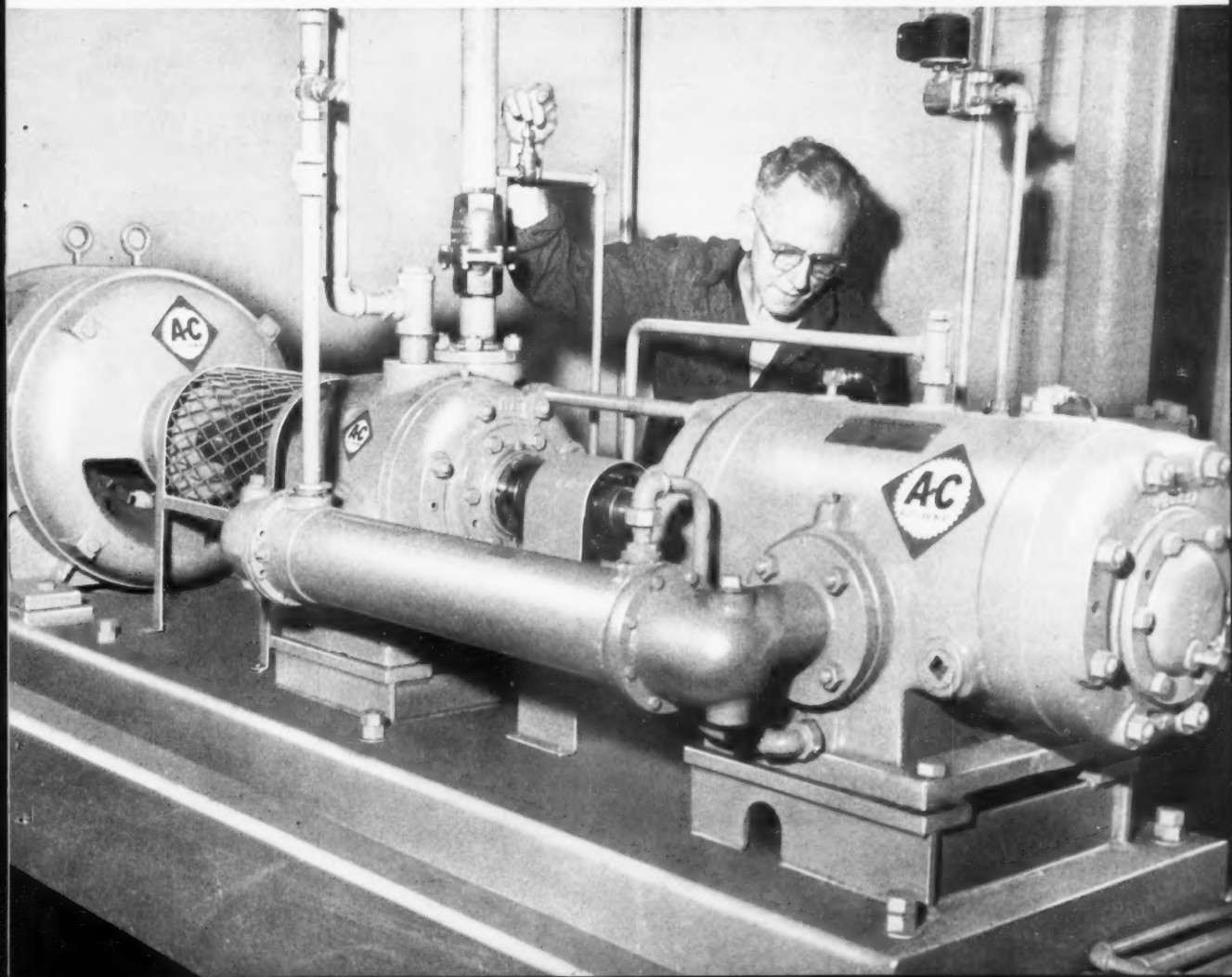


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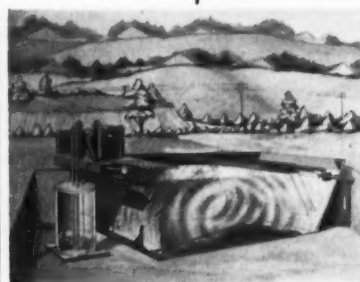
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the Bureau of Construction, and the Maintenance Department in setting forth technical, design, and detail requirements, but leaving adequate freedom.

(e) Coordinated review of plans in early stages of development to assure adherence to the same principles of sound economical planning and construction.

(f) Accurate cost-accounting of jobs by the Bureau of Construction to establish its costs of design and supervision.

The Committee concluded that "New York City, with difficult limitations in time and sites, has . . . buildings of a general high level in both technical and esthetic aspects. This high standard of achievement should be continued."

CEC-AIA Heads Meet

Charles Pate, president of the Consulting Engineers Council, and John Noble Richards, president of the American Institute of Architects, recently met in New York City. One result of this meeting was an invitation for Richards to speak before the annual CEC meeting in New York. Another result is a batch of proposals for joint solutions to joint problems.

As Pate pointed out, no formal action could be taken on the matters discussed without approval of the organizations' boards. However, the meeting itself was promising in that it was a departure for the AIA from its previously announced policy of discussing all interprofessional problems only through its joint committee with Engineers Joint Council. (The fact that CEC is now a member of EJC may have influenced this.) And the CEC is invited to send a speaker to the AIA national convention this summer, in New Orleans.

Pate suggested a number of CEC-AIA joint committees should be formed on the state level to discuss such problems as:

¶ Free Engineering — "It still appears that some 'free engineering' is the direct result of requests from

both architects and engineers . . . This can be solved through continued discussion and education by this committee."

¶ Fee Adjustments — "Discussions should be undertaken to provide a sliding scale of fees that will allow ample compensation to provide the detail engineering on small jobs as well as large jobs . . . Under the present procedure of approximately 6 percent fees for all jobs, the engineer or architect doing primarily small jobs cannot make a profit, and it is difficult for him even to stay in business."

¶ Owner Contract — "Regardless of which is the prime contractor, the names of each, their responsibilities, and the amount of the fees for the separate professions should be written into the contract . . . This procedure will eliminate the poor practice of bid shopping after a contract is awarded."

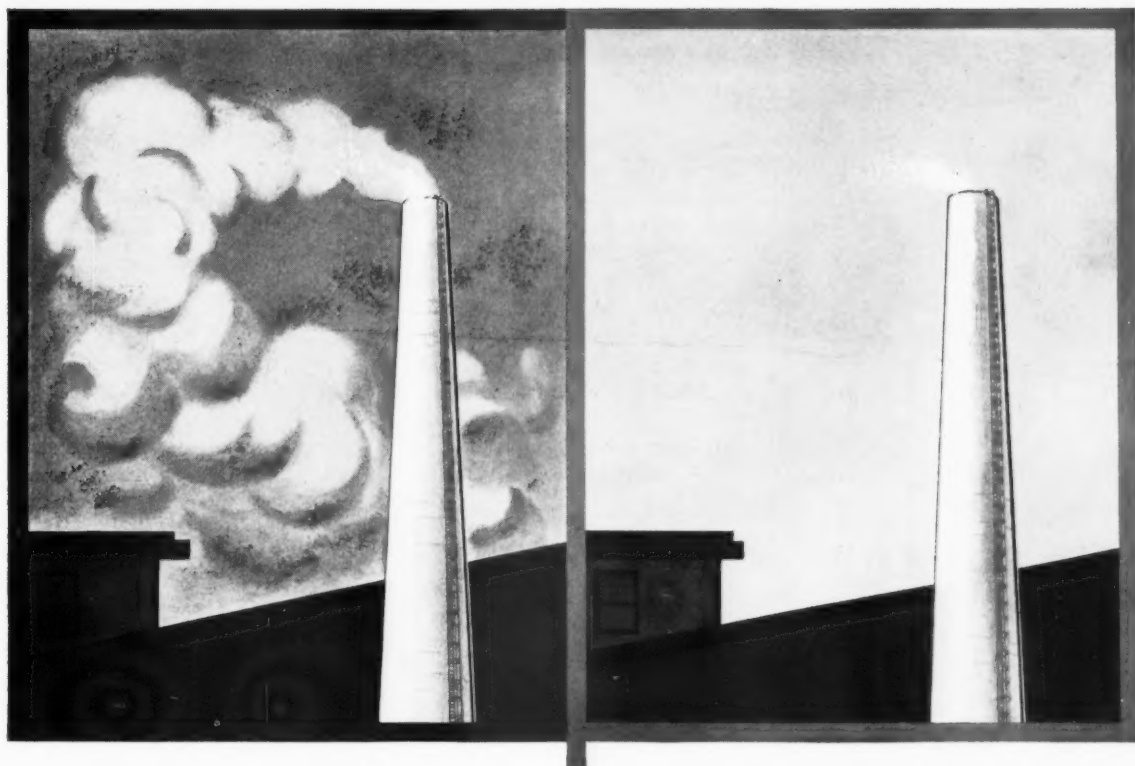
¶ Owner-Professional Conferences — "Both professions should be represented during these discussions and during the time of preparation of the preliminary sketches so that it will not be necessary to sacrifice quality and workmanship and make substitutions through lack of understanding of the problems involved."

¶ Responsibility — "I quote Mr. Richards, 'Each must carefully preserve his professional identity to give his best.' . . . The responsibility must be predetermined for the protection of both professions and the owner."

¶ Ethics — "Infringement so often is caused by a misunderstanding or lack of knowledge of the true meaning of the individual items" (in the various codes of ethics).

Richards agreed to transmit his opinions on these topics to local AIA chapters.

Mentioning the Massachusetts Interprofessional Code, adopted in 1952, which allows equal status to architects and engineers, Pate suggested that AIA and CEC get together to get a workable code. Morris suggested the two attend



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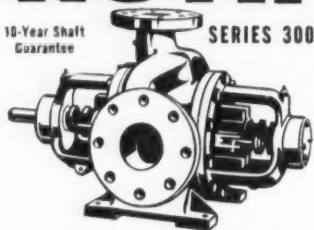
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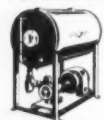
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the EJC-AIA joint committee meeting in Washington on June 5 to discuss this further.

"I am in favor of working through EJC on this provided some progress can be made," Pate said. "I do not want to become involved with a committee action of 8 or 10 organizations some of which are indifferent to the problems involved. CEC and AIA are the only two organizations vitally interested in this from both the professional and financial standpoints."

Referring to the recent policy statement issued by the CEC to the ICA on receiving bids for professional service, Pate also requested a liaison between AIA and CEC to work quickly if similar cases occur in the future. Richards said this would require action by his board.

"It was mutually agreed that most of the differences between the two professions can and will be solved through some such program as we discussed, but the most important factor will be meeting together, becoming better acquainted, and realizing that each is motivated by the same ideals," Pate concluded.

Tritton to Speak at CEC Meeting

The Consulting Engineers Council will learn more about its new international status at its New York City annual meeting. Speaker who receives top billing for the Council functions is Julian S. Tritton, of London, president of the International Federation of Consulting Engineers (FIDIC). Tritton addresses the convention at its Installation Banquet on May 1.

CEC is one of FIDIC's newest members, having been accepted for membership in the world organization early this year.

Tritton is a past-chairman of the British Association of Consulting Engineers and a member of the advisory council on overseas construction. He was, until recently, a partner in the consulting engineering firm of Rendel, Palmer and

Tritton, of London, England, and is now a consultant to that firm.

Following the meeting, Tritton will visit Washington, Chicago, and cities in Canada; then he will return to Europe to attend the annual meeting of FIDIC in The Hague, on May 28-29.

To Share Technical Sessions

The Engineers Joint Council has suggested that its constituent societies open their technical meetings to members of other EJC constituents at the same fees members would pay to attend the sessions.

ASME is first to make a formal announcement that technical meetings (not business sessions) are open to members of any EJC member. At conferences sponsored by any of ASME's professional divisions, the visitors will pay the same fee as that charged ASME members, usually one-half the non-member rate.

Glenn B. Warren, ASME president, said "Although this step may result in some loss of income to ASME we are confident that dollars spent in this way will pay dividends for the entire profession."

NSPE, not included in the ASME invitation, earlier invited all Founder Societies to send observers to NSPE business sessions.

"A representative of AIEE and I attended the Birmingham meeting of NSPE in February of this year and participated in discussion. At the present time there are no plans for myself or other representatives of ASME to appear at future meetings of NSPE," Warren concluded.

Model Law Revisions

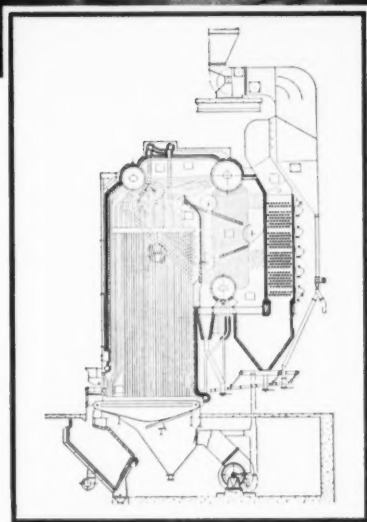
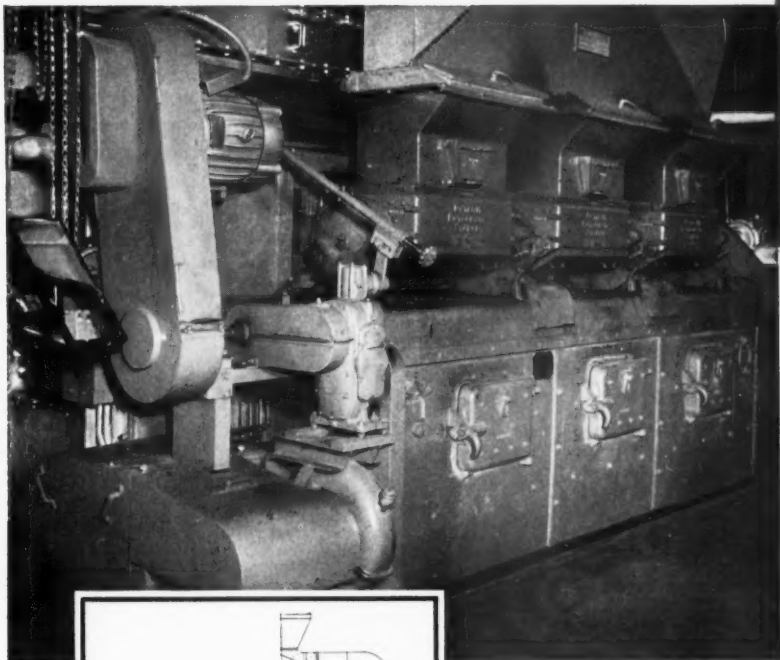
Suggested revisions of the Model Law currently are being circulated to members of the National Council of State Boards of Engineering Examiners and to representatives of the 19 engineering organizations that have expressed an interest in revisions.

An interim report will be compiled for the Aug. 19-22 annual NCSBEE meeting, in Roanoke, Va.,

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and President W. H. Larkin said it is hoped that the final revisions will be completed by 1960.

"Minor revisions and rewording are being suggested in a number of places in the present law," according to the *Registration Bulletin*. "Most of the discussion probably will be on changes being suggested on requirements for registration and whether or not to include a section on corporate practice in the law."

Among possible revisions suggested are:

¶ Should the Registration Law authorize boards to apply for relief by injunction to restrain a person from committing an unlawful act?
¶ Should there be a separate law for land surveyors? (And after the American Society of Civil Engineers recently released a statement that surveying is part of the civil engineering profession.

¶ Should the registration laws "spell out" registration requirements?

¶ Should the registration laws attempt to set up forms of organization for practice of professional engineering?

¶ Can teeth be put into the law for enforcement?

¶ Should ethics and advertising be written into the law?

Score Card

Inch by inch, million by million, the Engineering Headquarters building fund is getting there.

Last report was \$6,329,000 contributed. With the present Headquarters building tentatively valued at \$2 million, this leaves only \$2 million to go—"but the last \$2 million is the hardest to get," according to Clarence Davies, executive director for the new building.

Turner Construction Co. has been selected as general contractor, and the specifications and steel detailing are approaching the final stages of design.

Not much has been decided about the centralized facilities, but 3000 square feet have been set aside for this purpose. The exhibi-

tion hall, in which nobody is quite sure what will be exhibited, will be on the first floor.

Honest Partnership

In the East, where corporate practice is illegal in some states, it is not unusual for partnerships and corporations sharing the same office to also share the same officers.

A recent announcement from Westcott & Mapes Inc., of New Haven, Conn., states Carl W. Taylor has been elected president and Willis F. Thompson, executive vice president, of Westcott & Mapes Inc. A new partnership, Taylor & Thompson, succeeds the partnership of Mapes, Taylor, Thompson & Westcott.

"The firm of Taylor & Thompson has all of the resources of the corporation and its principal work is the design of bridges and superhighways. It also offers all of the services available in the corporation in various states where the practice of engineering is denied to corporations," the announcement states.

Incorporation Fever

It is Spring, and corporate practice season again, as the Committee on Engineering Laws and various engineering organizations square off for another nationwide bout.

Latest score, at press time, is: *California*: Five bills, affecting the practice of engineering, were introduced this year. One of these bills exempts a person practicing chemical or petroleum engineering from the Civil and Professional Engineers Act. This bill makes no provision for the registration of these engineers. It also would authorize persons licensed under the Civil Engineering Act to perform structural engineering.

Colorado: Corporate practice currently is allowed, provided the persons in charge of design or supervision are registered engineers. One bill, making minor changes in this law, has been introduced. Another bill, which would affect engineering

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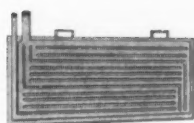
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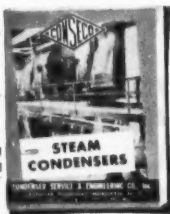
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through its definition of architecture, has been presented. No word on the outcome.

Connecticut: One bill has been withdrawn and one still stands. The issue—licensing of employee engineers working for manufacturing corporations. The bill proposes stricter regulations.

District of Columbia: The Professional Engineers Society is studying the possibility of sponsoring a revision in the current laws. Present District laws do not permit corporate practice.

Hawaii: The newest state wasted no time in getting into the corporate practice question. Current statutes permit both corporations and partnerships to practice engineering. A Senate bill has been proposed which would not allow corporations or partnerships to practice engineering.

Idaho: A bill passed the Senate, but died in the House. The proposal would have allowed corporations to practice engineering if the chief executive officer was licensed in Idaho and if a majority of the board of directors were licensed engineers. The present law makes no reference to corporate practice. *Illinois:* The Law permits a corporation to practice structural engineering provided the chief executive officer is licensed in Illinois. The Illinois Association of Consulting Engineers membership has been polled to learn its reaction to a House bill which would allow corporations to practice any type of engineering provided the chief executive officer or managing agent is a registered engineer. Two years ago, a similar questionnaire was circulated to IACE membership. The findings were inconclusive.

Kansas: A Senate bill has been introduced, redefining engineering and changing examination requirements. No mention is made, in either this bill or the current laws, of corporate practice.

Montana: A bill, which would have classified engineering into six groupings for license purposes,

never came to a vote. Rumor has it that the entire registration board threatened to resign if this bill went through—at which point the bill promptly got lost in committee. *Nebraska:* A bill was introduced raising registration fees and changing examination procedures.

New Hampshire: The statutes contain no provision for licensing of corporations, but corporations are allowed to practice engineering. A bill was proposed to require registration of engineers in responsible charge of projects involving interstate commerce.

New Jersey: There is discussion, by the New Jersey Society of Professional Engineers, of possible revisions to the state law this year. The law currently allows the corporate practice of engineering provided the person in responsible charge is a licensed engineer.

New York: Much smoke, no fire this year. Two bills were introduced, both with the blessing of the CEL and the announced opposition of the New York State Society of Professional Engineers. Continuing a tradition which began in 1953, the bills were not passed.

Ohio: A bill has been introduced which removes requirements for registration by an engineer or surveyor whose work relates solely to the design or fabrication of manufactured products. The same bill states that "No firm co-partnership, or association formed after January 1, 1960, shall engage in the practice of professional engineering or surveying unless each partner or officer is a registered professional engineer, a registered surveyor, or a registered architect." Which opens a question. What about corporations? And what associations have been performing engineering in Ohio?

Washington: Things are happening fast in the Northwest. A "trial bill," limited to two years, has been passed allowing corporate practice provided that those in responsible charge are registered engineers. This bill was passed by the House

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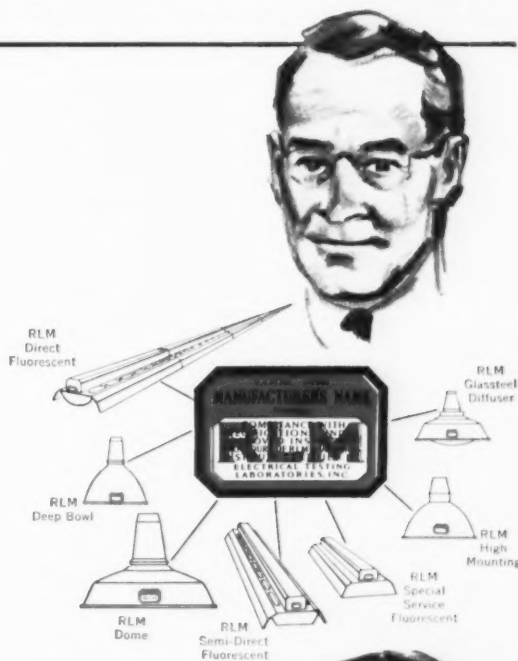
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at 11:54 p.m. on the closing day of the Legislature. At 11:58 p.m., it passed the Senate. But the action was just beginning. A referendum against the bill was filed with Secretary of State Victor A. Meyers. If sponsors of the referendum can get 45,160 signatures by June 10, the part of the law to which they object will be held in abeyance until it can be put to a vote during the 1960 elections. Word filters East that this issue has caused considerable dissension among members of the Washington Society of Professional Engineers.

Wyoming: A bill has been introduced restricting the use of the term "engineer."

AEC Case Decided

The Supreme Court has allowed Jerome S. Spevack to go ahead with his plans for obtaining patents for the heavy water process he developed while working for the Atomic Energy Commission. Spevack had obtained an injunction against AEC, stopping publication until he could get patent rights.

The Supreme Court said that if Spevack would pay the patent filing fee by May 25, his patent (which had been pending because of lower court rulings) would be granted. The injunction is dismissed if Spevack does not proceed with patent plans.

Engineers Joint Council appeared as a friend of the court on behalf of Spevack. The AEC had taken the heavy water process off the secret list.

New Employment Service

One of the items to be discussed at the New York State Society of Professional Engineers annual convention in June is the newly formed State Employment Service.

Operating since Dec. 1, this Service is nonprofit, operating on contributions from employers and registered engineers placed in jobs.

At first, it was mentioned that the Service would locate consulting engineers for those needing

their services. However, this was decided against on the basis that it was not ethical on a fee basis. The director, Elliot Carnay, explained that "there still is a tremendous need for engineering service by small industry, the public, attorneys, individuals, and government agencies. In every line, our membership includes some specialists. Many engineers are hungry for these small jobs."

"Often individuals, with an engineering problem, do not know where to look for a consulting engineer. Some of them do not even know what a consulting engineer is. What shall we say when they call? That we don't know any consultants? Some kind of a setup should be found to meet this need."

"We should work out some method of providing the public with three names and let them do their own negotiating. We could rotate the names on the list, so no partiality would be shown. After all, you can call the medical or bar associations and be given three names of professional persons," Carnay concluded.

Another matter scheduled for discussion at the convention is adding two additional rulings, one in regard to an engineer who fails to complete a project within reasonable time without good cause, and the other in regard to fee-splitting. These are being considered as additions to NYSSPE definitions of unethical conduct.

A Functional Section of Engineers in the New York City Public Service also will elect its first officers at the annual meeting. This section, formed at the NYSSPE winter general meeting, is what is generally called the "sounding board" group, to represent engineers (registered or otherwise) in the city employ.

The formation of the section created an unusual problem. For the first time, the NYSSPE has functional section affiliate members who are not registered. However, these affiliates will not have



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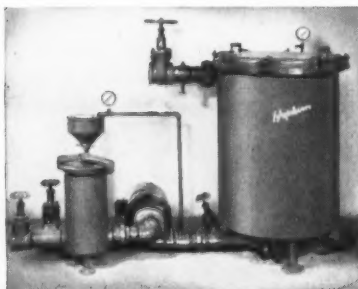
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the right to vote or to hold office in their organization.

Also at the annual meeting, Dr. Anatole R. Gruehr, of Brooklyn Polytechnic Institute, will be installed as president. Dr. Gruehr, representative of NSPE as an accredited nongovernmental agency at the United Nations, is chairman of the NSPE Committee on Engineering Preparation.

NSPE Board Meeting

The Board of Directors of the National Society of Professional Engineers, at a recent meeting:

¶ Received three new member societies—Hawaii, Maine, Oregon.

¶ Announced that the long-awaited architect-engineer forms of agreement, in which the AIA, ASCE, and NSPE had been “cooperating” for a number of years, was published by NSPE alone.

¶ Adopted a formal definition of competitive bidding.

¶ Charged that figures indicating a decrease in freshman engineering enrollment are “misleading.”

Among the more interesting developments of the meeting was the announcement that the architect-engineer forms of agreement now are available for purchase. The original study on architect-engineer forms was begun a number of years ago, with ASCE also co-operating. After ASCE decided to withdraw from the study, AIA and NSPE continued . . . continued, and continued. Finally NSPE published six forms—three with the engineer as principal and three with the architect as principal.

At the request of the ethical practices committee, the NSPE Board adopted the following definition:

“Competitive bidding for professional engineering services is defined as the formal or informal submission, or for receipt, [sic] of verbal or written estimates of cost or proposals in terms of dollars, man days of work required, percentage of construction cost, or any other measure of compensation whereby the prospective client

may compare services on a price basis prior to the time that one engineer, or one engineering organization, has been selected for negotiations. The disclosure of recommended minimum or median fee schedules of various engineering societies is not considered to constitute competitive bidding.”

At the meeting of the Functional Section for Engineers in Private Practice, the task force on fees submitted a final draft copy of a revised fee manual. This document will be published as a general guide for consultants.

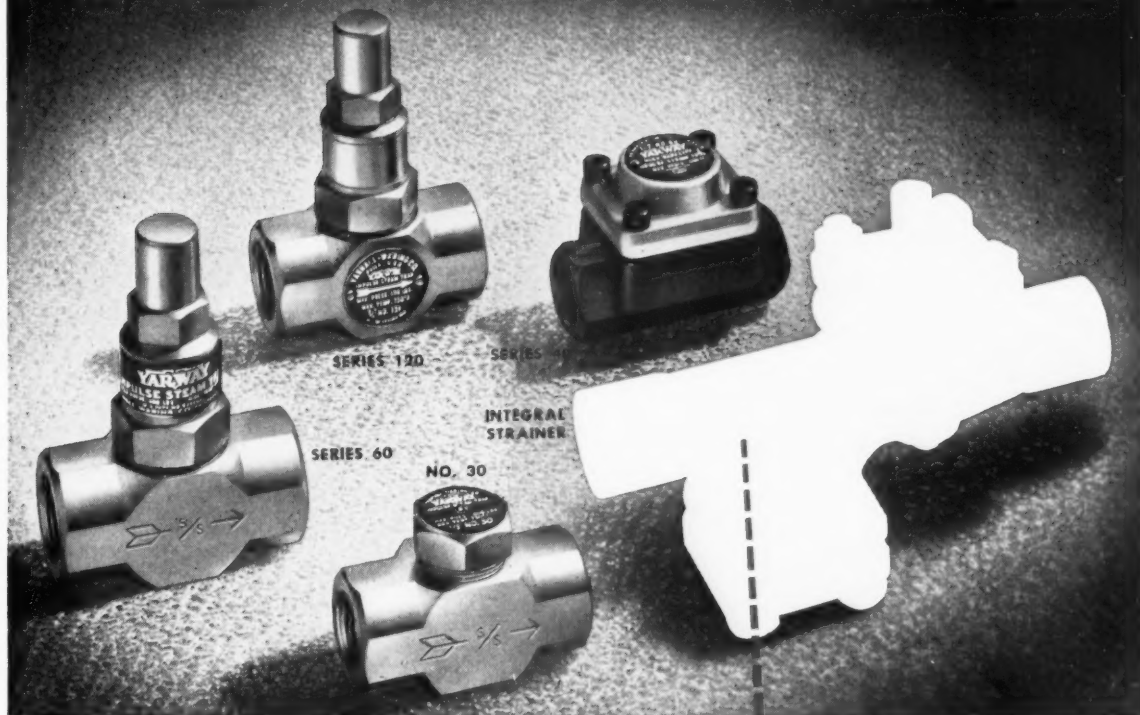
A constitutional amendment was suggested to state more specifically the powers of the Board in disciplinary cases. It was suggested that the constitution be amended to state that the Board “may expel, suspend for a stated period of time, or censure a member-at-large or recommend any of the above disciplinary actions to the Member State Society through which a Professional Engineer or Junior Member holds his membership.”

Results of a survey on functional sections showed 22 state societies with such sections, 12 planning to organize functional sections, and 12 of the 22 already having functional groups planning additional sections. This same survey showed a wide difference in application of the functional section concept although most constitution and bylaw provisions are essentially the same in the various states.

In line with recent unity discussions, a survey also was made to get membership opinion on the possibility of extending NSPE membership to qualified but non-registered engineers. (This would be a necessity under the AIEE Functional Plan.)

Although expressing a “desire to extend the membership of NSPE in any reasonable way to assist in the implementation of the Functional Plan,” a majority of members replying favored the continuation of registration as an essential requirement for membership. ▲▲

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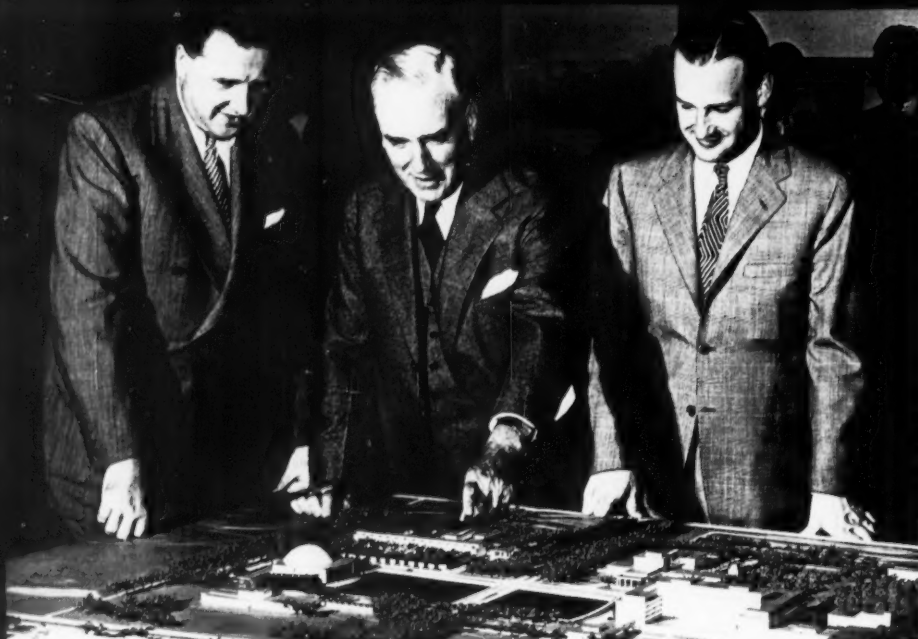
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Ford News Bureau

Close cooperation between client and engineer is required during the fundamental design stage. Here top Ford management confer with Voorhees over model of new Research and Engineering Center.

Proper Design Takes Planning



PERRY COKE SMITH, Partner
Voorhees Walker Smith Smith & Haines

Perry Coke Smith studied general engineering at Newberry College (1914-1916) and Chemical Engineering at the University of Wisconsin (1916-1917). He received his Bachelor of Architecture degree from Columbia University (1923) following two years' service in the 30th Engineers, A.E.F., during World War I where he was awarded the Croix de Guerre with Star. Before becoming a Partner, in 1938, in the New York firm of Voorhees Walker Smith Smith & Haines (formerly Voorhees Walker Foley & Smith), he did design work with Donn Barber, McKenzie Voorhees & Gmelin, and Voorhees Gmelin & Walker. Smith is a former design critic at Princeton University, and he is now chairman of the Advisory Council of the School of Architecture. A Fellow in AIA, he is a past president of the N.Y. Chapter, A.I.A., and a member of The Architectural League of N.Y., BRI, Columbia Associates, Municipal Art Society, National Housing Conference, Inc., and National Institute for Architectural Education. He also serves on the Advisory Council for the School of Engineering at Columbia.

THE PROBLEMS to be solved in designing buildings rapidly are becoming more numerous and complex. Today the mature consulting engineer has witnessed during his career the innovation and use of a host of new materials, systems, methods, and arrangements. Despite this progress, a study of human activity and a conversation with operating people would show that we only have begun to approach the solutions to the many problems that exist.

Even in the simplest sort of modern building design demands the coordination of several skills—mechanical, structural, and electrical engineering and architecture as a bare minimum—while some projects require many more. Regardless of the number involved, direction and coordination is vital and in themselves represent a special skill.

My experience in design coordination has been extensive, for I was professionally raised, so to

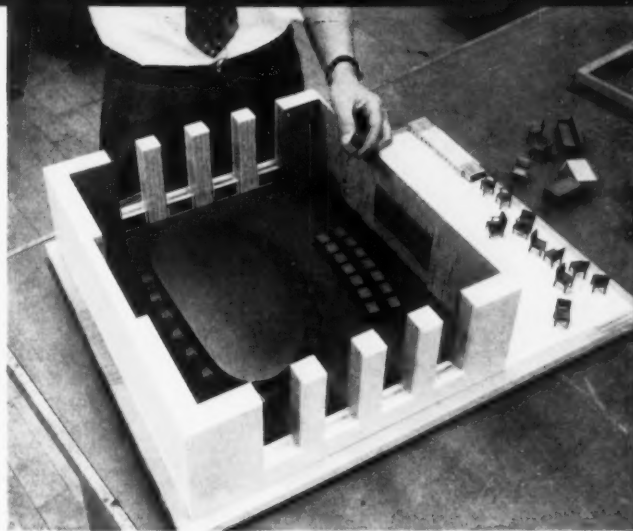
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speak, in an office whose staff handled the principal range of skills required in modern building design. This experience has covered 30 years; yet, only in the past five years have I fully understood the importance of procedure and plan in building design development. With my partners, I have under my direct control the eleven or so design skills of our staff, and I have been able, therefore, to try out and establish effective procedures. My studies and experience lead me to believe that there are certain basic methods of design coordination that are applicable to any type of practice.

The Three Important Elements

There are three primary elements in organizing a design effort. The first is the acknowledgement of leadership; the second is the understanding by all that there must be some point in the progress of the work when all major design decisions will have been made and approved; and the third is a plan of orderly procedure that will bring about this condition.

The need for leadership may seem obvious, but all too often it does not exist. Planning and investigating by committee is possible and even has advantages, but even a committee requires a chairman, and engineering design usually requires even



Stuart Smith

Later in fundamental design, a study must be made of determinations involving arrangement and architecture.

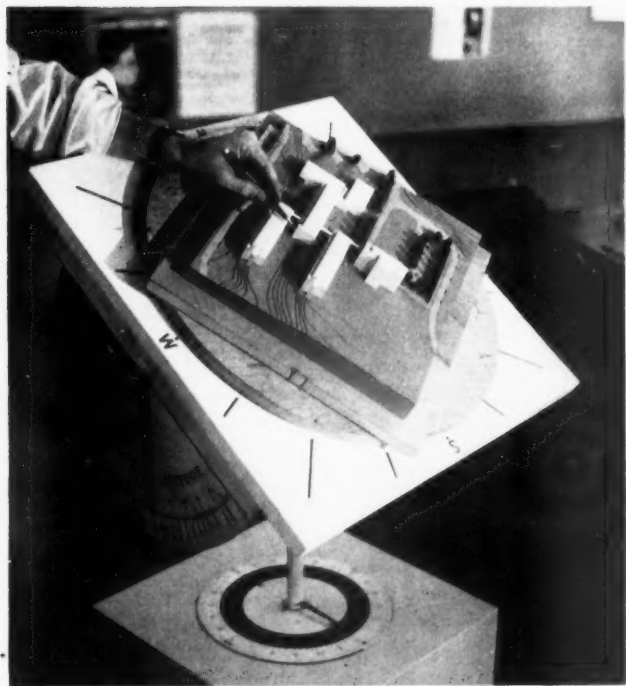
more than that. It takes intelligent, firm, confident leadership and a recognizing of and respect for that leadership by all those working together.

As to the second element, in our office we abandoned long ago the use of the word "preliminary" to describe a stage in the development of a design. The approval of preliminary concepts can have little value. We have for some years referred to this as a period of fundamental design. We feel that this fundamental design is complete with the assembly of the documented records of all major design decisions describing a project which the owner is well content to build and can afford to build with the money appropriated.

Scope of Fundamental Design

A review of the many factors involved in a typical project will make clear the scope of fundamental design, as defined in our office. Let us say we are to design a laboratory building for an open site. Site drawings show the arrangement of the electrical distribution, potable and process water supply lines, drainage lines, sanitary and process waste lines, and the location and arrangement of utility equipment. Reports describe the systems, show sizes and capacities, and where appropriate give an economic justification. Surface site drawings show existing and finish grading, paving, planting, and lighting. Specific types of paving, the general character of planting, and any special lighting are covered in separate reports.

The building itself is completely designed and shown architecturally. Its occupancy is indicated and positions of partitions and fixed and connected equipment are established. In some instances movable furniture arrangements are shown to relate them to special spaces or to modules. Architec-



Stuart Smith

In early design stages heat and light conditions of a project are studied with a model on a sun machine.

tural character and impression is shown by elevations, perspective renderings, and usually by a detailed model on a developed model site.

The structural system, the electric distribution system, and the heating, ventilating, and air conditioning systems are shown on drawings and described in reports. In the case of our example, a laboratory, the plumbing is shown in considerable detail to illustrate with complete clarity the solu-

tion of the modular bench, hood, and equipment service systems. The same applies to the modular electric service. Benches, service strips, fume hoods, and lighting fixtures are illustrated with detail drawings, and all the service systems and equipment items are covered by appropriate reports.

All finished materials and finishes are chosen and listed, and the hardware is selected down to and including the locks and door closers. Movable

LABORATORY BUILDING

FUNDAMENTAL DESIGN WORK PLAN

GROUP A. 2—DETERMINATIONS WITHOUT REFERENCE TO ARRANGEMENT

Determinations	VWSS&H	Date	Client	Date
A. 2. 1 — Determination of module	Analysis & recommendation — Based on outline of requirements for unit areas described in A. 1. 2 1 — Types & sizes; 2 — Range & diversity	5/25	Comments & approval	6/7
A. 2. 2 — Laboratory service distribution	Analysis & recommendation 1 — HVAC; 2 — Piped services; 3 — Electric; 4 — Plumbing	5/25	Close cooperation with VWSS&H. Approval	6/7
A. 2. 3 — Building code; State regulations	Investigation of statutory limitations 1 — "Use" group; 2 — Type of construction	5/18		6/7
A. 2. 4 — Structural system	Investigation & recommendation 1 — Superstructure; 2 — Foundations	5/18	Approval	6/7
A. 2. 5 — Windows	Investigation & recommendation	5/25	Approval	6/7
A. 2. 6 — Lighting	Recommendation 1 — Intensity; 2 — Type; 3 — Fixtures	5/25	Comments & approval	6/7
A. 2. 7 — a. Floor heights b. Ceiling heights	Investigation & recommendation (by areas)	5/18	Approval	6/7
A. 2. 8 — Interior materials	Analysis & recommendation by areas 1 — Floor; 2 — Walls; 3 — Ceiling	5/18	Approval	6/7
A. 2. 9 — Exterior materials	Investigation & recommendation	5/18	Approval	6/7
A. 2. 10 — Roof	Recommendation 1 — Flat; 2 — Pitched; 3 — Material	5/25	Approval	6/7
A. 2. 11 — Stairs	Recommendation — unit areas 1 — Required (legal); 2 — Convenience & service	5/11	Approval	6/7
A. 2. 12 — Vertical transportation	Recommendation — unit areas 1 — Passenger; 2 — Freight	5/18	Approval	6/7
A. 2. 13 — HVAC*	Recommendation — unit areas	5/25	Approval	6/7
A. 2. 14 — Power*	Recommendation — unit areas	5/25	Approval	6/7
A. 2. 15 — Emergency power	Recommendation 1 — Legal requirements; 2 — Owner's requirements	5/18	Approval Owner's policy, including laboratory needs A. 2. 15. 2	6/7
A. 2. 16 — Plumbing**	Recommendation 1 — Water systems; 2 — Waste systems	5/25	Approval Owner's standards	6/7
A. 2. 17 — Signal systems	Recommendation 1 — Fire alarm & detection; 2 — Watchmen; 3 — Clock	5/18	Approval	6/7
A. 2. 18 — Communications	Recommendation 1 — Telephone; 2 — Underfloor duct; 3 — Intercommunication	5/18	Approval	6/7

*For building. In conjunction with A. 2. 1

**For building. Including fixtures; location of drinking fountains.

furniture, movable floor coverings, and interior fittings and decorations are decided upon.

Detailed Study Yields Cost Estimate

It is evident that this detailed analysis of the intended design enables a fairly close estimate of cost, which is, of course, a part of the job and completes the documentation. We now have a complete description of "a project which an owner is well

content to build and can build with the money appropriated."

After this fundamental design is complete, there are no major problems of design coordination. Contract drawings and other documents can be written from this point at production capacities. Although the design process never stops until a project is in service, from here on coordination is routine, involving primarily the contractors and the representatives of the engineers and architects who must see to it that he matches the deed to the word. The real problems of coordination exist in the earlier stages leading up to the completion of the fundamental design. The method and procedure involved here represent that third prime element in design organization.

HOW THE WORK PLAN WORKS

The Fundamental Design Work Plan used by Voorhees Walker Smith Smith & Haines is indicated in the example given at left. This is part of the Work Plan for a college laboratory building. The actual Work Plan is printed in six parts, of which this is part two. The whole would include:

1. Functional Analysis
1. Determinations Without Reference to Arrangement (shown at left)
3. Determinations of Arrangement
4. Determinations of Architectural Character
5. Data Requirements
6. Schedule of Submissions

The heart of this Work Plan is to be found in items 2, 3, and 4, for here we find the schedule for the fundamental design work. Parts 3 and 4 are similar in style to part 2, but they deal with arrangement and architectural expression instead of with the engineering questions that do not involve arrangement.

Note that the specific factors requiring decision are listed in column 1, while column 2 shows what the engineer is expected to do in regard to the decision. Column 3 shows the date of decision, column 4 the client's part in the decision, and column 5 the date of the client's action.

The use of this Work Plan makes it possible to see at a glance just what decisions are required, the order in which they must be made, and the role of both the engineer and the client.

Written Plan of Procedure is Vital

I believe that regardless of how experienced and skilled design leadership may be, the end results are greatly accelerated and improved through the use of a properly written plan of procedure used by all concerned. By this I do not mean merely a schedule or a check list. What I do mean is a full listing of all the decisions that have to be made, the order in which they can best be made, and the kind of information required in order to make them. Also, this work plan notes who does what and when. It clearly states the area of decision of the owners and the designers. It even goes so far as to show which aspects the clients want submitted for discussion before being submitted for final approval, and which require submission for final approval only.

The use of plans of procedure is nothing new. In industry, preplanning commonly is applied with gratifying results to machine processes and human actions. But in the design office we must have the same kind of approach applied to the process of reasoning, creation, and selection. Although planning is no substitute for intuitive talent, talent is not often sufficient alone.

A Main Conference Room

Take for an example an item that might appear in a design work plan. Assume that we are to design an office building for owner occupancy by a large business firm and that the program of requirements is complete with respect to the categories and quantities of occupancy. Going into more detail, assume the need for a main conference room to accommodate 60 people. In a good design this conference room will be the right size and shape; it will be conveniently located; the acoustics, air conditioning, and illumination will be satisfactory; it will be properly equipped; and its architectural expression will be appropriate and



Stuart Smith

As design progresses a model is built so that not only engineers but clients understand the solutions.

pleasing. All these good things must come about without any being devalued or lost.

We cannot simply start making drawings in which a conference room 60 x 15 square feet in area will fall in some geometrically convenient location on the paper. Instead, we must start with a work plan that states our need for certain determinations and shows who initiates action, who decides, and when. We must deal with definite problems such as a suitable seating arrangement; optimum



Stuart Smith

But the fundamental design is not complete until a report has been written and printed on these presses.

acoustic criteria; the most convenient and desirable location; and characteristics of auxiliary facilities such as toilets, coat rooms, sound barrier vestibule, storage and motion picture screen and projection facilities.

After these determinations are made, the conference room can appear on study plans with some form, and the work plan can carry an item requiring an interim approval of size, shape, and location.

The Work Plan is a Timesaver

In the meantime, the work plan has indicated the need for the determination of air conditioning, illumination, and power criteria. Again this plan indicates who initiates the action, and shows who decides and when. Now the practical design of this conference room can proceed and be assimilated quite easily into the whole design without any serious disturbance.

The work plan also carries notations to develop the architectural expression of this room. I believe that designed character should be thought of as accomplishing something, rather than as an expression of personal taste or accident. So the work plan will ask what is to be accomplished and schedules actions to this end.

It may seem to some that this procedure extended to all the design problems of a building is labored and unnecessary. Quite to the contrary, it is a timesaver. The work plan recognizes design determinations in their proper order. It also assigns responsibility for action and sets dates. The owner, who is responsible for the statement of needs and acceptance of solutions, is given at the outset a complete chart of the course to be followed in the design process. This puts the owner in the design group and enables him to plan his manpower and effort in advance. In any design operation, large or small, there is nothing quite so frustrating to progress and coordination as an owner's organization that is out of balance with the design group.

Unification of Skills

Naturally, the composition of a work plan for any design is susceptible to a number of variations. However, there are two general principles that are well worth mentioning. First, there should be no separation of the technical interests in the documentation. By this I mean that it is unnecessary and undesirable to have a separate work plan for each branch of engineering, or for any special phase of the work. The design process requires varied skills, but these skills all are engaged in a common objective. Unification of skills is basic and good design management.

Second, the work plan must be separated into main categories with respect to the nature of the



Stuart Smith

Design skills should not be separated. All branches of engineering and architecture must work together.

determinations to be made on the project. There are three main categories:

¶ Determinations that can be made without reference to arrangement

¶ Determinations of arrangement

¶ Determinations of architectural expression.

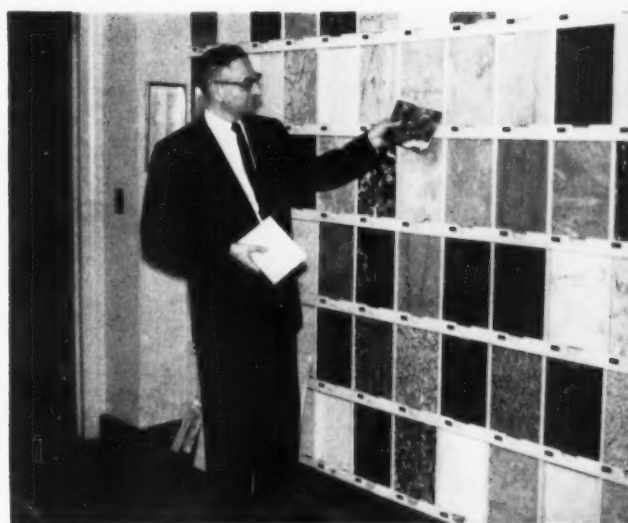
To sort out and arrange the subject matter of design in this manner helps to clarify thinking.

Determinations without reference to arrangement include criteria, loads, and capacities. In this phase, for example, the temperature and humidity standards are decided as well as the space modular system and the modular size. Such a matter as glass area in relation to exterior wall is determined on its own merits, uninhibited by considerations of arrangement or architectural expression. This phase of the work stockpiles the materials from which a design is to be assembled.

The part of the work plan covering determinations of arrangement is fundamental. Here we set down the steps and procedure that decide the relationship of all the design, from small parts to sub-assemblies to the whole.

Determining architectural expression is considered largely a matter of taste and intuitive decision, which, of course, it is, but I believe that setting down a plan for procedure is in itself a beneficial discipline for the architectural designers.

Separating the work plan into the three categories recognizes three different kinds of thinking required in the design processes. The first category involving requirements and criteria requires fact finding and cross reference. Arrangement calls for



Stuart Smith

Final stage in fundamental design involves architectural expression, the selection of color and texture.

venturesome inventiveness tempered by experience. Architectural expression involves imagination and taste. Seldom do all of these qualities exist in one person or in one professional group. Furthermore, the three kinds of thinking must go on concurrently.

It is apparent that the owner has a differing character of interest. When it comes to requirements and criteria, his position is prime and the designer's is advisory. In arrangement, the designer leads but requires periodic comment and agreement from the owner. As to architectural expression, the best results generally are had when the owner's assertions are forceful only in proportion to his taste. Thus, the owner's responsibility for initiation is in a descending scale through the three categories. Design progress and results are improved, therefore, if design offerings for approval are made wherever possible in this order. Yet how many designs have we all seen that evidently were accomplished exactly in reverse? How many times have we spent good time and effort preventing this catastrophe?

After the work plan is divided as described, the setting down of the proper order of determinations is simplified. It is rewarding to write down the logical and reasonable sequence for thinking out a design and to see these steps lead to the whole.

If the listing of the elements of the design problem is complete, the sequence of determinations organic, and the arrangement suited to uninhibited parallel thinking in the main categories, then we have a good work plan, which is the primary implement in leading a well coordinated effort to a successful design. ▲▲



Westinghouse Electric Corp.

Although nuclear reactors generally are simple to operate, plant safety dictates elaborate instrumentation.

Making Hazards Reports Make Sense



KARL H. PUECHL, Manager
Theoretical Department
Associated Nucleonics, Inc.

Karl H. Puechl has been Manager of the Theoretical Department of Associated Nucleonics, Inc., Garden City, Long Island, New York, (formerly Walter Kidde Nuclear Laboratories, Inc. and currently a subsidiary of Stone & Webster Engineering Corporation) for the past six years. In this capacity, he has been responsible for the physics design of a variety of power, production, and research reactors. Puechl is a member of the American Physical Society and the American Nuclear Society. He also is serving on the reactor safety subcommittees of both the American Standards Association and the American Nuclear Society.

FOR EVERY NUCLEAR REACTOR built in the United States, a hazards report must be prepared. These are generally the work of consulting engineers, and it is most important that the person or group performing the hazards analyses and writing the report for presentation to the AEC Advisory Committee on Reactor Safeguards (ACRS) have the proper philosophy. They must realize that they could be the final deterrent to the construction of a hazardous plant, and they must be completely unbiased even though the plant design may be their own. Because of the strong possibility of bias, however unintentional, it may be well to have the hazards investigation carried out by other engineers than those who have major responsibility for the plant design. In fact, it even may be better to have

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the work carried out by consultants who are antagonistic to the design.

Actually, the Advisory Committee on Reactor Safeguards is the final authority. Theirs, legally, is the final responsibility, but we cannot expect this committee or the Atomic Energy Commission staff members to review the final hazards report and in a short period of time become more expert at pointing up possible failures than are the engineers who spent months becoming intimately familiar with the plant design, operation, and possible failures. The sole function of the ACRS should be considered no more than final assurance that the facility owner is intimately familiar with the contemplated plant and that he is duly aware of the possible hazards and consequences. If the actual possibility of any major hazardous accident not previously conceived during the hazards investigation can be detected by the ACRS, then the entire investigation must be considered a total failure, and it would be best to begin again with a complete review by other, more competent engineers.

Definition of a Maximum Credible Accident

The boundary between accidents that are credible and those that are incredible is not clear cut. However, the definition of credible is fast evolving, based on precedents in previous hazards presentations. It is well to study other hazards reports before deciding in your own mind where this boundary exists, and the reactor hazards evaluation staff of the AEC can provide valuable guidance. Much work currently is being done along these lines by standards committees of the interested technical societies. The work of these committees is extremely difficult in that the standards must assure safety without undue conservatism or subsequent inflexibility. They eventually will arrive at standards that define a maximum credible accident for at least the common reactor types.

High costs for safety can retard the industry as much as a maximum catastrophe! After arriving at a definition of a maximum credible accident for a nuclear plant, it might prove enlightening if a definition were established, through a similar chain of reasoning, for a maximum credible accident in another hazardous industry. Carrying through an analysis of such an accident using methods employed in analyzing nuclear accidents would lead to astonishing results.

A most difficult task is to determine the boundary of credibility for a novel reactor type. For example, one can begin the evaluation using the perfectly reasonable assumption that if two liquids are involved in the system, a credible occurrence is for them to come together, no matter what precautions are taken to prevent it. If there is a chemical

affinity between these two liquids, they will then interact, and heat will be released.

Consider the consequences of this assumption for a large sodium-cooled central station reactor that either uses water as a moderator or transfers its heat to water in the power generation cycle. A typical plant might have an inventory of 100,000 pounds of sodium. Assuming there is more than ample water in the system to allow for complete chemical reaction, the resulting heat release would be 2.5×10^8 Btu. A spherical container 150 feet in diameter designed to boiler code specifications would require at least a one-inch thick shell to contain the pressure rise. This makes no allowance for any nuclear heat, sensible heat stored in the reactants prior to interaction, or other chemical heat that might be generated during a maximum accident. Furthermore, it also does not consider the effects of shock waves which might result from this violent reaction.

Obviously under such a definition of credibility, the containment costs are high. Would any less stringent definition of credibility be prudent? This question cannot be answered without specific knowledge of the plant design and its operation. Even with this information, it is doubtful that general agreement could be obtained.

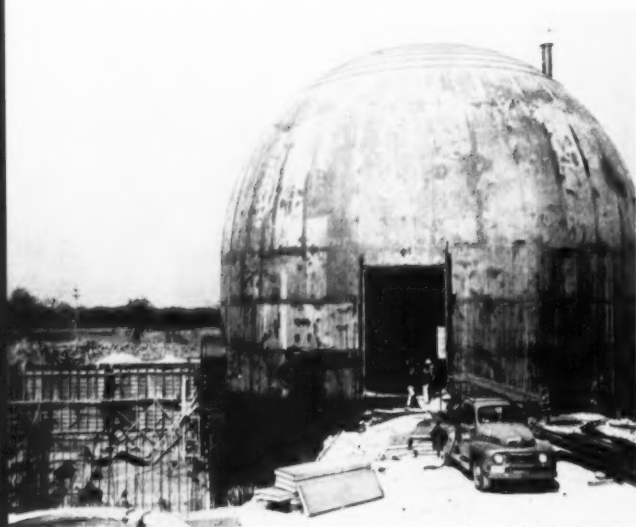
Analyzing for Failures

We consider the analysis of possible failures the most important feature of a hazards study. Intimate familiarity with the entire plant design and its operation is the key to a worth-while report. No logical search and subsequent analysis of possible failures can be made otherwise.

In preparation for a hazards study, a number of persons should become thoroughly familiar with the design, and then there should be a conference at which these men review the design and operating procedures and try to conceive of all possible failures. Once conceived, the failures and subsequent events should be described qualitatively. Out of a score or so conceivable failures, it usually will be found that about three of these are most serious, the others being lesser corollaries. Thorough investigation of these major failures then should be made quantitatively to ascertain the course of events and the magnitude of resulting heat generation, pressure build-up, and radioactivity release.

In arriving at the ultimate magnitude of maximum accidents, multiple independent failures need be considered only if operation can proceed after one failure has occurred. All failures involving malfunctioning of instruments fall into this category.

The quantitative analysis of a failure should always be conservative. It is extremely simple, however, to heap one conservative assumption upon



Argonne National Laboratory

Above-ground containment vessel under construction for Argonne's Experimental Boiling Water Reactor.

another and eventually assume a ridiculous result. It is best, therefore, to begin the analysis with a conservative mathematical model, but then proceed on a realistic basis. Wherever possible experimental evidence such as that obtained from BORAX and SPEART should be utilized.

In determining the accidents to be investigated, some consideration should be given to the probability of occurrence. In particular, accidents with high probability, even though the resulting hazard may be no more than a nuisance, should be analyzed in detail. These analyses might indicate the need for minor design changes or the economic advisability of including additional safeguards or decontamination facilities.

Containment Considerations

Once all accidents have been analyzed and the resulting fission product release determined, the engineers should ascertain the need for containment. Local weather conditions should be taken into account in arriving at appropriate atmospheric diffusion constants. Operating procedures also should be considered, since round-the-clock operation may require containment, while operation limited to lapse weather conditions may be tolerable without containment. Whether containment is decided upon or not, the effects of a major fission product release on the surrounding area and off-site populace should be calculated. This should be done, not so much to demonstrate the effect of an incredible accident, but to ascertain the maximum liability management may incur. It also illustrates the need for

strict administrative control in all plant operations.

If containment is needed, then the next step is to demonstrate the invulnerability of the container. The container must be shown to be capable of containing the products of the maximum credible accident. Internal pressure build-up, thermal stresses, and missile release must be considered. Effects of storms, earthquakes, and floods should be investigated. In general, it will be found that invulnerability cannot be guaranteed against sabotage. Less than 10 pounds of dynamite can rupture most presently contemplated containers. The best solution to this is to demonstrate that rupture of the container by a small explosive charge will not in general lead to the destruction of the reactor and subsequent fission product release unless the saboteur has intimate knowledge of the plant. Strict security control is then an acceptable demonstration of invulnerability.

Mathematical Analysis of Accidents

Because of the variety of reactor types, it is impractical to attempt to outline all theoretical procedures for estimating hazards. This information can best be obtained in working on the actual design of a particular reactor. Ideally, starting from an initial power and an initial rate of reactivity rise, reactor power as well as local heat generation, temperature, and pressure should be calculated as a function of time. Complications arise as a result of the feedback of temperature and pressure through local reactivity coefficients. These coefficients may depend not only upon the local conditions, but also upon the temperature and pressure existing throughout the system.

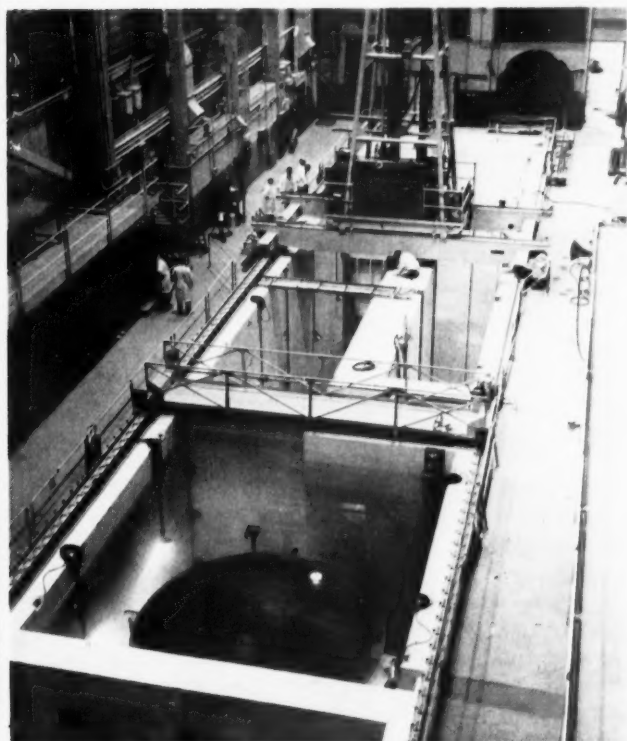
For example, in a homogeneous reactor with a reflector, the temperature coefficient of reactivity associated with the reflector depends not only on the reflector temperature but also on the fuel temperature. This is true because the reflector is more effective when the fuel is more dilute, and therefore at a higher temperature. Since the effect of temperature on reactivity depends upon the temperature in each of those regions as well as upon the rates of temperature rise (which depend upon the initial power and subsequent rate of reactivity rise, which, in turn, depends upon the initial power, the initial rate of reactivity rise, and the initial temperatures in the system) a temperature coefficient of reactivity at any particular instant obviously has no meaning unless it is characterized by the conditions that exist throughout the system.

Preparing a Hazards Report

On the basis of the data gathered, the studies done, and the assumptions made, a hazards report can be prepared. It seems best to begin a hazards re-

port with a brief description of the site. Location, size, meteorology, geology, hydrology, seismology, and surrounding population distribution should be covered. This should be presented so that it can be used in later portions of the report for estimating the ultimate effect of fission product release to the ground or air.

Next should come a general description of the plant, showing not too detailed drawings of all the areas. Then, each plant area should be described individually. The location of major pieces of equipment and their operating capabilities should be pointed out. Particular attention should be given to safety devices. In particular, the reactor building and vapor container should be described in detail, pointing out the design of all entrance and exit lines so as to ensure positive containment. Allowable leakage specifications on the container should be indicated and the proposed method for leak testing outlined. The radiation monitoring system also should be described in detail. Detailed descriptions should be included of the provisions made for minimizing damage from fire, storm, flooding, and earthquakes, using here the data that previously were presented in the description of the site.



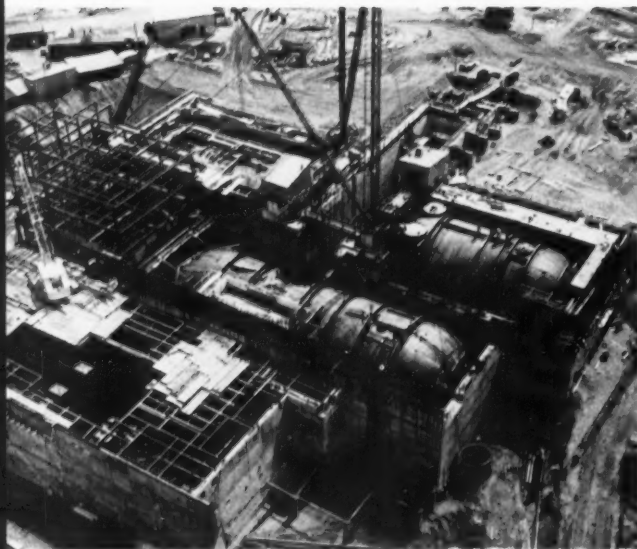
Westinghouse Electric Corp.

The Shippingport fuel canal room (reactor container in the foreground) where fuel elements are unloaded.

Following this description of the over-all plant, the reactor itself should be described in detail. This should include description of the core structure, fuel assemblies, control rods, instrumentation and control systems, shielding, and experimental facilities. Flux distributions, reactivity versus time, control requirements, control-rod worth, control-rod speeds, and temperature coefficients should be reported. The description of the fuel assemblies and control rods should include the results of experiments or the performance record of similar elements in other reactors. The control philosophy including the scram and set-back levels on all instrumentation should be discussed. All this must be sufficiently detailed so that it would be possible for a qualified reader to perform for himself a complete accident analysis of the system. If later on in the accident analysis it is assumed that certain events cannot occur, the proofs should be reported here.

Plant operation should be taken up next. This should describe the operation of the reactor, including start-up, routine inspection and operation, and fuel unloading and reloading. Waste disposal also should be covered in detail, both for normal operation and in the event of minor and major failures. In particular, all precautions and preventive devices for minimizing hazards should be pointed out in detail. The normal functioning of the instrumentation and scram systems under various failures should be described as well as the adequacy of the biological shielding. The surrounding radiation levels due to normal air-borne radioactivity release should be presented, showing that the stack height is sufficient to allow the safe normal release of the radioactive product. Trip levels on stack discharge and other radioactive effluent streams should be indicated. The operation of the plant should be described under high probability failures such as power failure, small primary system leaks, and fuel element rupture. The response of the reactor to small transients should be noted to show that normal operation is stable.

The accident analysis comes next. Both nuclear and nonnuclear incidents should be considered. All conceivable accidents should be mentioned to illustrate the fact that they have been thought of. Only a small number need be analyzed in detail, if it is shown that the other accidents are corollaries of these major ones. Often, accidents are analyzed under the assumption of a variety of instrument failures, but the fact that these instruments must fail during the course of the accident is not emphasized sufficiently. In order to adequately illustrate plant safety, as well as to show at the same time the result of maximum accidents, it is well to give as much emphasis as possible to



Westinghouse Atomic Power Div.

This photograph of Shippingport during construction shows the buried fission product containment vessels.

the discussion of the number of failures which must occur during the course of the accident for it to reach its ultimate conclusion.

The ultimate mechanism for reactor shutdown or destruction also should be discussed in detail. For water reactors, for example, the possibility of water-metal chemical reactions should be considered. Assumptions should be validated wherever possible by experimental evidence. In general, where chemical reactions are possible, it will be found that the chemical heat release overshadows the nuclear heat which is released during any prior excursion.

The accidents that are analyzed should be carried to their ultimate conclusion, showing the final pressure in the container immediately after the occurrence, the effect of subsequent fission product decay heat, the effect of missiles emerging from the reactor, and the effect of possible thermal stresses on the container due to hot gas or liquid ejection onto the shell. The amount of fission products released from the fuel into the container should be determined, and the resulting radiation doses around the container should be presented to show whether evacuation and future approach to the container to enable decontamination is feasible or not.

Hazards to the surrounding area due to fission product release from the container are logically the next items to be reported. It should be demonstrated that off-site dose rates are not severe for the container design leakage rate. Before consider-

ing the effects of container rupture, it is best to point out the near impossibility of this occurrence. That is, the safety features, containment design, and low probability of the accidents previously described should be re-emphasized.

The dose rates resulting from loss of containment as a function of distance from the reactor site should be presented for various weather conditions. There also should be discussion of external doses, inhalation doses, fall-out doses, and rainout doses. In general, doses need not be carried out to extreme distances (hundreds of miles) since it will be possible to show that severe doses cannot be obtained that far away.

Also included should be an indication of the number of people who might be exposed above the accidental tolerance limitation. This will require some population distribution information. The direction of the wind also should be included to show the probability of exposure in various directions. The effect of fall-out should be treated in some detail to show how much surrounding area may have to be evacuated in the event of an ultimate catastrophe. For large power reactors these numbers may be frightening, but it should be remembered that it is for this reason that containment is always provided.

Hypothetical Reactor Catastrophe

Consider a 125,000-kw (electrical) nuclear power plant that is destroyed after 100 days of full-power operation. Assume that only one percent of all the fission products normally stored in the fuel after this length of operation breach the container and are released to the atmosphere. On these bases, Table 1 lists the doses that can be anticipated as a function of distance from the reactor under both normal sunny day (lapse) weather conditions and under normal nighttime (inversion) conditions.

Under inversion conditions, the radioactive cloud tends to spread out less rapidly than under lapse conditions. Therefore, higher doses can be obtained under nighttime than under daytime conditions. Also shown in the table are the number of people who would be exposed to the radioactive cloud at various distances for an assumed population density of 200 people per square mile. The dose rates are given in units of the lethal dose, 600 rem. A dose of 1 means that all individuals exposed to the cloud will die.

It is seen from the table that the inhalation dose which eventually results in harm to the bones is the major hazard. During daytime weather conditions, lethal doses could be obtained out to a distance of two miles from the reactor, and over this distance about 50 people could be exposed to a lethal quantity of radiation. The actual num-

TABLE 1 — HAZARD FROM REACTOR CATASTROPHE

	Lethal Dose* Distribution on Sunny Day				Lethal Dose* Distribution on Clear Night			
	1	3	10	30	1	3	10	30
Distance in miles								
Number of people cloud passes over	18	142	1336	10,420	3	23	192	1320
Gamma dose from cloud	0.13	0.02	—	—	0.9	0.3	0.07	0.01
Fall-out in three hours	0.06	0.01	—	—	0.7	0.1	0.01	—
Bone dose for people outdoors	2.1	0.3	0.03	—	88	17	2.8	0.5

*Lethal dose of 1.0 equivalent to 600 rem

ber of deaths probably would be less than this since, in order to receive the total maximum inhalation doses, the people must be outdoors or at least have their windows open. Ten deaths perhaps would be a more reasonable estimate.

Nighttime Conditions More Severe

If the catastrophe occurred under normal nighttime conditions, lethal doses could be obtained out to a distance somewhat greater than 10 miles. Over this distance a few hundred people could be exposed to lethal radiation. Again, considering the fact that not everyone living in the area would be out of doors, a more realistic estimate as to the number of deaths would be about 100 people. It should be pointed out that radiation sickness occurs in most individuals after being exposed to about 100 rem, or 1/6 the lethal dose. Under daytime conditions, this dose could be received by a few hundred people and under nighttime conditions by several thousand.

The fall-out dose shown in the table can be received within three hours after a catastrophe. This time was selected as being long enough to permit evacuation, which is assumed to be practical. In all probability some evacuation would be necessary, and it is well to consider the cost of possible evacuation before a plant location is decided upon. Evacuation of a large manufacturing plant obviously would be quite expensive since production would come to an immediate halt.

The length of time that a particular area remained uninhabitable depends upon the magnitude of initial fall-out, the frequency of rainfall (which could wash the radioactivity away), and the decontamination measures that could be carried out. Evacuation might be necessary for only a few hours, but conceivably, a month might be required before tolerable activity levels could be obtained.

Finally, appendices should be included in the report to give detailed information on the site

characteristics, theory and calculations of the accidents, and calculations on the invulnerability of the container.

Future Trends

We have had considerable experience in this work, and we feel that containment is not the ultimate solution to reactor safety. It should be considered only as an interim device for buying time while reactor operating characteristics are still a question mark. Until much operating experience has been gained, we agree with the philosophy of containment, feeling that the young nuclear industry cannot afford a full-scale uncontained catastrophe.

It should be pointed out, however, that evaluations are being based more and more on precedents. This legalistic philosophy can readily lead to ultraconservatism, since it is possible to go overboard in the analysis of ridiculous accidents and incur unreasonable expense for safety features. When the project is on a tight schedule, the designers would rather overdesign for safety than risk a delay in ACRS approval by being realistic. Such ultraconservatism on the part of one installation subsequently can result in increased safety costs for all. Because of this reactor designers should be realistic in evaluating reactor hazards. The ACRS committee is amenable to reason and certainly is willing to be convinced if the hazards analyst has the courage of his convictions and sufficient evidence for support.

Once universal standards have been set, the situation will change somewhat. Complete hazards analyses of conventional systems will not be necessary. Novel safeguard schemes will require the modification of codes, and it is hoped that modifications will be readily made if they do not sacrifice safety. Ultimately, after much operating experience has been obtained, we can look forward to uncontained reactors with proven safety devices to ensure against fission product release. ▲▲

MATTHEW BOULTON



THOMAS TELFORD

GEORGE STEPHENSON



JAMES BRINDLEY

Samuel Smiles—The Engineers' Alger

DR. THOMAS P. HUGHES
Washington and Lee University

SAMUEL SMILES was probably the greatest public relations man engineers ever had. He made the simple virtues and the great engineers household words not only in Victorian England but in much of the 19th century world. Smiles was a sort of British Horatio Alger, but instead of writing fairly farfetched novels of bootblacks who rose to be bank presidents, he applied much the same pattern to biographies of famous engineers. All of his heroes exuded Victorian virtues. They were born poor but succeeded both financially and professionally through hard work, honesty, and diligence.

Engineers Were Practical Men

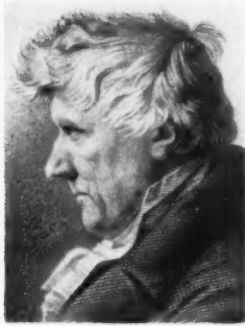
Most all of us, today, are inclined to sneer a little at this unsophisticated success formula, and it also must be admitted that Smiles no doubt failed to see some of the faults in his subjects' personalities, but it remains that he did not need to exaggerate much to make his point. The Victorian engineers really were, for the most part, men who made their way up the ladder the hard way. They really did start off poor but honest, and many of them did achieve outstanding honors through their own

hard work and ingenuity. But if Smiles was fortunate in having such model characters to portray, his subjects also were fortunate to have Smiles to tell the public about their lives and accomplishments. By the time Samuel Smiles had completed his literary work, England loved her engineers. Their names were known to every schoolboy, and their great works were familiar to all.

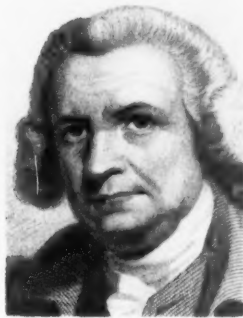
Smiles' Background

Smiles, himself, was of plain Scottish ancestry. He studied medicine and practiced this formerly ill-paid profession until he found white-collar work by day and took to writing didactical and biographical pieces by night. His white-collar positions included the editorship of a small town newspaper (*Leeds Times*) and a secretarial position with a large railroad. His writings included some of the best sellers of the 19th century.

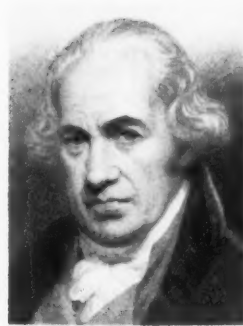
While yet in his twenties Smiles published his first book at his own expense. *Physical Education* won some favorable reviews in British journals but made little money. With its moralistic overtones and dedication to self-improvement, the subject was typically Smiles. He later wrote articles entitled, "Health," "The Improvement and Educa-



JOHN RENNIE



JOHN SMEATON



JAMES WATT



JOHN METCALF

tion of Women," "Provide," "The Widows' and Orphans' Fund," and "Factory Women." His article "Drinking" so favorably impressed the temperance people that they gave the publisher a handsomely bound copy of Peter Burne's *Teetotaler's Companion, or, A Plea for Temperance*.

Smiles might have lived out his life working at his office job by day and writing minor articles

in the evening if he had not decided, when he was about 40, to do a biography of the great railroad engineer, George Stephenson. Busy as secretary for the South Eastern Railway, he needed several years to complete his first-hand investigations, research, and writing, but with this book, published in 1857, he found the formula for successful writing. This biography, and the others he was to write about



George Stephenson's son, Robert, was designer of Newcastle's 4000-ft "High Level Bridge," opened in 1849.



The Olive Mount Cutting on the Liverpool and Manchester line was 80-ft deep in parts, 2-miles long.

engineers later, combined a story of virtue and of success, placing it against the engineering and industrial background of the Industrial Revolution.

Smiles' Books Become International Success

The middle and the ambitious working classes read Smiles voraciously. Along with the edifying example of the self-made man and copious anecdotal material, the reader got his measure of interesting and quite competent descriptions of engineering works. The biography of Stephenson went through five editions in little more than a year, and Smiles, still writing in the evenings, then produced a series entitled, *Lives of the Engineers*. In 1861 and the following year, he wrote biographies of James Brindley, John Rennie, Thomas Telford, John Metcalf, John Smeaton, James Watt, and Matthew Boulton. All but the last two were civil engineers; Watt and Boulton were mechanical. Later Smiles wrote an *Industrial Biography* describing the life and works of such great iron workers and tool makers as Henry Maudslay and Joseph Bramah.

Not only were these books popular in Britain, but translations appeared throughout the world. Smiles frequently complained, however, about the American editions which brought him little or no compensation because most were pirated by U. S. publishers. The Italians loved him. Perhaps it was because Italy was so newly united and striving so for greatness that she responded so enthusiastically to the formula of virtue and success. When Smiles visited Rome, the venerable Garibaldi asked that he visit him; the beautiful and intelligent Queen Margherita honored him with a private interview; and the skilled sculptor Rossetti insisted upon executing his bust.

In addition to his biographies of the engineers, part-time writer Smiles published other titles including, *Self-Help, Character, Thrift, and Duty* (translated into 17 languages). These, like his *Lives*, had a message for the reader, but always the message was a variation on his theme of virtue and success. Smiles noted with some bitterness that he wrote one biography of a virtuous but unsuccessful man, and it was his only unsuccessful biography. Virtue was not enough its own reward for the Victorian reader.

Engineers Were Humble and Honest

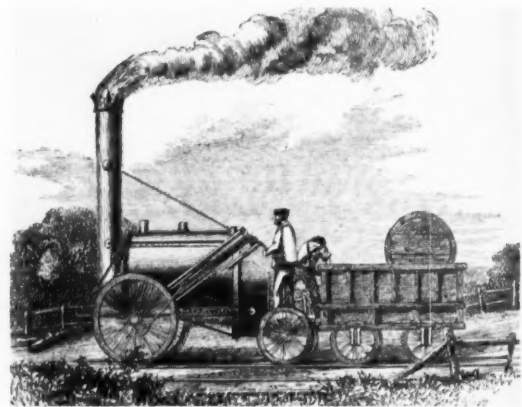
In general, Smiles' engineers all were of humble but honest origins and from rural Scotland or northernmost England. They usually apprenticed in the building trades and embarked upon plans of self-education. While doing skilled labor they experienced many hard knocks, but these did not tempt the young men to abandon simple habits and sound virtues; they prepared and saved for

the future. Excelling in their crafts, they frequently traveled to London or other metropolitan centers to observe and copy the masters of the trade.

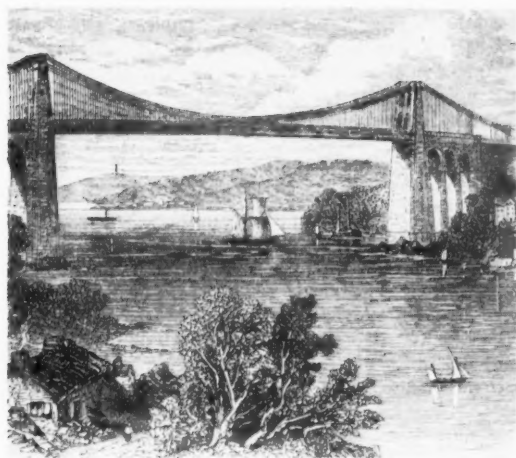
Demonstrating abilities and character far above those of the other workers, the young men soon were singled out for responsibility, and within a short time found themselves entrusted with major engineering works, for formally educated engineers had not yet closed the ranks of the profession. In middle years, these engineers were busy constructing roads, canals, harbors, bridges, industrial plants, and railroads. In later life, prestige, comfortable financial circumstances, good and famous friends came to them. Finally, these men of humble origins found their final resting place amidst the most prestigious and dignified surroundings. (Telford, a poor country lad, rests in the nave of Westminster Abbey, and John Rennie in St. Paul's near Sir Christopher Wren).

Smiles drew remarkably similar character portrayals of all his engineers. They were honest without exception and were especially circumspect in dealing with the speculators and contractors in an age when financial scandal was not unknown. Their professional integrity precluded poor work even if the result was a high bid and a lost project; they built for safety and for the ages. All worked long and patiently, extending the working day into the evening hours, but the resultant fatigue and anxiety did not preclude good humor and sociability. Only occasionally did the engineers give way to the strain of especially trying construction conditions. These were men of high purpose, striving for the betterment of man's material condition and only incidentally interested in fame or money.

They did not ignore architectural considerations, and their bridges evoked warm response from the



Stephenson's engineering accomplishments include the invention of the famous "Rocket" and the construction of the Manchester and Liverpool Railway.



Telford's Straits of Menai chain suspension and stone arch bridge had a center span 579-ft long, used 2187 tons of wrought iron in 33,265 pieces.

aesthetically sensitive segment of the population. Like their bridges, the engineers were embellished with the adornments of culture, some taking to poetry and others to such diverse interests as rare books and music. Although their activities in later life removed them from manual labor, they did not lose their youthful skills—and occasionally showed the workmen how the job should be done.

Rags to Riches and Culture

The career and the personality of the Smiles engineer are well illustrated by examples from the *Lives*. John Metcalf (1717-1810), builder of good roads in the age of the rut, and George Stephenson (1781-1848), designer of the famous "Rocket," are typical. Metcalf, blinded at six by smallpox, compensated admirably with his other senses. He supported himself and his young wife by such diverse occupations as fish mongering and fiddle playing. George Stephenson, born near Newcastle in a colliery village and the son of a "careful and hard-working" colliery worker, found employment when quite young as a herdboy, coal picker, and gin-horse driver at the mine. In later life, by contrast, Stephenson dined with the eminent Sir Robert Peel, the British Prime Minister.

John Rennie (1761-1821), builder of the great Albion Mill and London's Waterloo Bridge, was typical of the Smiles engineer in his unusual manual dexterity and his mastering of a building craft. Rennie, also typical in his precociousness, fitted up the machinery and the housing for several substantial mills before his 20th birthday. Rennie was not typical in one way—he had a university education. Through summer work he paid for his years

at the University of Edinburgh and had the good fortune to study under two of her greatest science professors, John Robinson and Joseph Black. This unusual experience for a Smiles engineer probably explains the greater emphasis put by Rennie upon engineering theory. Incidentally, while educating himself, Rennie found relaxation in the mastery of French and German.

Thomas Telford

Thomas Telford (1757-1834), the first president of the Institution of Civil Engineers, pioneer with iron bridges, great road builder, and designer of the magnificent suspension bridge across the Straits of Menai, also learned a building skill at which he excelled and carried out a demanding program of self-education (he was with the majority in having no university education). As a skilled stonemason he perfected his craft by moving out of his home country, in Scotland, and by finding employment first in Edinburgh and then in London. Not satisfied simply to do his job well, he studied the architecture of notable local buildings and spent many hours over the printed chemistry lecture notes of Edinburgh's Professor Black. He wrote at the time, "the mode of making mortar in the best way led me to inquire into the nature of lime" and to pursue this inquiry "into some books on chemistry." Needless to note, Telford soon became a foreman.

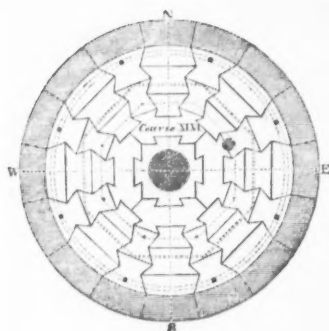
George Stephenson did not learn to read until he was a 20-year old engineman on a colliery steam engine. In the evenings he mastered reading and arithmetic alongside the children of other laborers. While watching his steam engine, he worked out the sums assigned him by his schoolmaster, proving himself quite adept at arithmetic. It goes without saying that he mastered the mechanical details and operation of his steam engine.

The Uneducated George Stephenson

Despite his fervor for self-education and his genius for engineering, George Stephenson bore the superficial marks of an uneducated man well into his middle years. It was most embarrassing to him when, as the engineer of a great railroad project, he had to appear before a Parliamentary committee. Opponents of the project, skilled barristers aware of the witness's rural dialect and inability to find the words necessary to explain his impressive knowledge of engineering problems, so bewildered Stephenson that one member of the committee asked if he were a foreigner and another hinted that he was mad. Even though 42 at the time, Stephenson thought of going to school again to overcome these handicaps. Yet Ralph Waldo Emerson said "it was worth crossing the Atlantic were



The Bettman Archive



The Eddystone Lighthouse was built of prefabricated stone blocks, marked to allow simple onsite erection. Plan of the 46th course show the interlocking design.

it only to have seen Stephenson—he had such force of character and vigor of intellect.”

Engineering Works Enhanced

After describing the childhood and various educational experiences of his engineers, Smiles then devoted the bulk of the biographies to the engineering projects of his subjects. He had a great talent for interweaving the human interest and technical aspects of an engineer's activities. The reader's interest was held as he read of the building of bridges, digging of canals, constructing of harbor facilities and lighthouses, and outfitting of mills.

The biography of John Smeaton (1724-1792) was highlighted by a description of the Eddystone Lighthouse. This was the greatest project of a man who may well be considered the first great civil engineer of the British industrial revolution. Writing of Smeaton's greatness, Smiles notes that James Watt spoke of him as “Father Smeaton” and said “his example and precepts have made us all en-

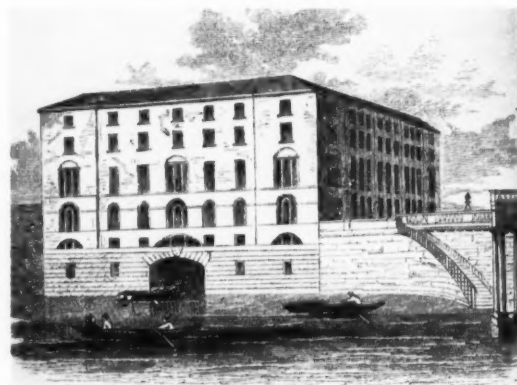
gineers.” Robert Stephenson, son of George and a distinguished engineer, himself, declared Smeaton to be the engineer of the highest intellectual eminence to appear in England.

The Eddystone, off the Cornwall coast and near the Plymouth harbor, consisted of a reef barely visible at low tide and almost completely submerged at high. Numerous ships and lives had been lost when violent storms lashed its victims up against its jagged projections. The dangers and problems of building a lighthouse on the rock to prevent these losses were considerable. Workmen could remain on the reef for only a few hours and in good weather; massive building stones for the house had to be brought by boat from the mainland, which was miles away.

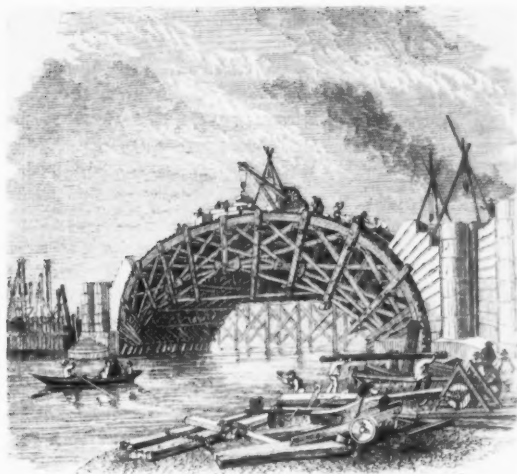
Building the Eddystone Lighthouse

Smeaton designed his structure to be a projection of the rock upon which it rested. He dovetailed the building stones first to the reef and then with one another in a solid structure to the height of 35 feet—beyond the heavy strokes of the waves. Above this level he built the various compartments for the keepers and the lights. After three years the structure neared completion, and in his great anxiety, Smeaton took up residence there to supervise the final steps. On October 16, 1759, the light was first exhibited and the reef, instead of remaining a dread hazard, lighted the mariner's way along the coast or into Plymouth harbor.

In another of his biographies, that of John Rennie, Smiles singled out the engineer's outfitting of the Albion flour mill, in London, as outstanding among his engineering works. Combining his apprenticeship as a millwright, his untypical scientific education, and his experience in the Soho works of Boulton and Watt, Rennie was uniquely



The Albion Mills, using steam-engine power for many purposes, was the mechanical marvel of its day.



John Rennie was both engineer and architect for London's Waterloo Bridge. It was constructed with nine stone arches, each of 120-ft span, supported on 20-ft thick piers. The bridge, started in 1810, was completed in 1817.



prepared to design in iron and steel. When still in his twenties he equipped the greatest mill of his era with Boulton and Watt steam engines and machinery of his own design. The Albion mill is an engineering milestone for it was one of the first major applications of steam for purposes other

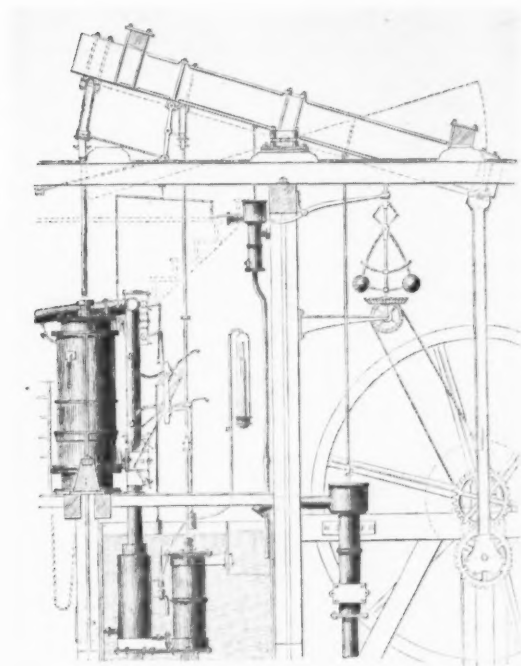
than pumping. It was also the first factory to use iron for shafts and gears. Rennie used both cast and wrought iron, carefully formed, as a substitute for the clumsy wood members of mill machinery. Rennie, thereafter, frequently was consulted by his contemporaries concerning problems in machine design and outfitting.

Rennie's subsequent work, however, was largely in civil engineering. He carried out two major projects contributing considerably to his prestige and to the welfare of his nation: the Waterloo Bridge, in London, and the drainage of the coastal fens to the north of London. With such a variety of achievements, Rennie certainly deserved the title of engineer without any limiting civil or mechanical adjective attached.

The Waterloo Bridge

In building the great Waterloo Bridge he employed four new engineering techniques. He used cofferdams in a great tidal river; he employed an ingenious method for constructing, floating, and fixing the arch centers; he used masonry of unusually large dimension; and he designed elliptical arches of an exceptionally great width. In addition to the engineering genius displayed, Rennie gave London an aesthetically magnificent bridge which did justice to the noble facade of the Somerset House from whose terrace the bridge projected. Upon completion of one of London's great bridges, Rennie respectfully declined an offer of knighthood from the Prince Regent.

In draining the fens—and here he was carrying on work which Smeaton had begun earlier—Rennie did, "with skill and industry so much" for a



Matthew Boulton and James Watt built this double-acting steam engine for the Albion Mills in 1786.

land "for which nature had done so little." Thousands of acres of fertile land lay under water in the Cambridge and Lincoln fens and, while there had been attempts at drainage, the expedients seldom lasted out a season. Not only was the land useless, but the poor souls who eked out livings in the fens were of a most depraved sort, driven to crime by the necessities of their situation. The fennemen, so the story goes, would seek out wives of some fortune and then bring them back to the fens to die—survived by their modest wealth and their acclimatized husbands.

Draining the Fens

Showing enormous ingenuity, striving for permanence, and utilizing considerable capital, Rennie directed the drainage work for almost 10 years. Making use of catchwater drains and cutting down the outfalls to an adequately low level, Rennie's scheme reclaimed tens of thousands of acres of rich soil; "boats, fish, and wild-fowl disappeared, and the plough took their place," Smiles says. The inhabitants like the land were reclaimed; the fen people called Rennie the great "slayer of dragons."

Thomas Telford, like Rennie, used his engineering genius to the great advantage of a backward area; as Smiles stresses in his biography of that great engineer. The Highlands of Scotland bear the mark of his greatness. In the 18th century Scotland, especially the northern Highlands, had the reputation of being a barren land populated by an ignorant and at times troublesome people. The Scotch in the north were among the few peoples in western Europe who continued to use the ancient "crooked-foot" rather than the plow. "The people," to quote Smiles, "had not yet learnt to bend their backs . . . to the stubborn soil, and they sat gloomily by their turf-fires at home, or wandered away to settle in other lands beyond the seas."

Roads and Bridges in the Highlands

To improve these unhappy conditions in the Highlands, Parliament appointed a Commission in 1803, with Telford as the engineer. Believing poor communications the major cause of the backwardness of the area, the Commission authorized Telford to begin work that culminated some 18 years later in 920 miles of capital roads and over 1200 bridges. Telford himself wrote, "I consider these improvements among the greatest blessings ever conferred on any country. About £200,000 has been granted in 15 years. It has been the means of advancing the country at least a century." Smiles commented, "Agriculture made rapid progress. The use of carts became practicable, and manure was no longer carried to the field on women's backs. Sloth and idleness gradually disappeared before the energy,

activity, and industry which were called into life by the improved communications."

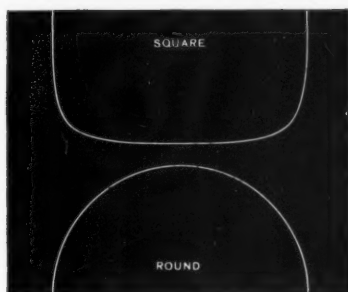
The Manchester and Liverpool Railway

One of the most significant engineering achievements of another Smiles engineer, George Stephenson, was the construction of the Manchester and Liverpool Railway. Completed in 1830, this railroad has been described as the experimental workshop and the laboratory for railroad building in Britain. Not only did Stephenson build great bridges, but he demonstrated daring in laying his road directly across the Chat Moss, an immense peat bog about 12-miles wide. Everyone warned him that the bog would prove a bottomless pit, and the project could only end in financial calamity. Stephenson, however, persevered, convinced that his plan could prove successful from both the engineering and financial point of view. A critic ridiculed the plan before a Parliamentary committee—the same hearing that brought Stephenson embarrassment on account of his dialect and his poor vocabulary—and asked, "who but Mr. Stephenson would have thought of entering into Chat Moss, carrying it out almost like wet dung . . . ignorance almost inconceivable."

Stephenson did not carry out the mass of spongy pulp like "wet dung" but confounded his critics and completed one of the best and cheapest sections of the line by floating a roadbed over the bog. He extended the bearing surface of the locomotive and the tracks by means of cross sleepers resting upon a matting of heather and tree branches. After the trains began to run across the floating road the perceptive traveler might feel a certain springiness in the road, but that was all. However, Stephenson's critics, and even his supporters, feared the venture would fail in some stage of its construction. According to Smiles, Stephenson never lost heart in the face of alarms and dour prophecies and lived by the motto "Persevere."

Character and Genius

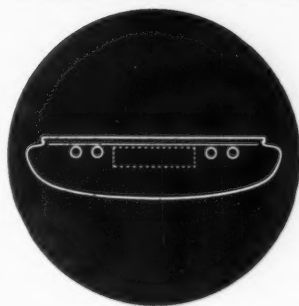
In these biographies of Samuel Smiles' engineers, the reader may find many other edifying examples of character and genius. Yet question is raised. Could the Victorian engineers have been the models of self-help, character, thrift, duty, and success Smiles sets them out to be? Did Smiles idealize in his zeal? Perhaps so, but Smiles engineers did live to ripe old ages, their friendships were frequently great and warm, they were financially successful, and their roads, bridges, canals, and railroads proved of great benefit to their fellow men. And, of course, there may be many engineers just like them today—but there is no Samuel Smiles to write their story! ▲▲



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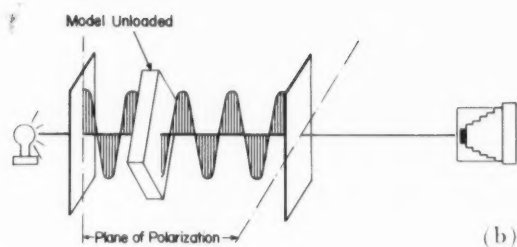
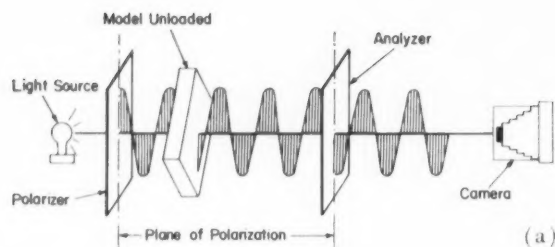
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We Study Stresses With Polarized Light

HANS WALTER, Dipl.-Ing.
Dr.-Ing. P. Walter, Consulting Engineer
Essen, Germany

SEVERAL YEARS AGO our consulting engineering firm faced a major problem and the possible loss of considerable money. A large concrete silo designed by the firm showed serious cracks shortly after completion. The best engineers in our firm were positive that their design calculations had been correct and that the cracks in no way reflected a design weakness. We were sure that they were the results of faulty materials or construction, but it was impossible for us to prove this by any kind of mathematical calculation, for the structure defied all mathematical analyses.

While we were wondering what we could do, a younger member of our firm remembered some discussions he had with Professor Kuske, at the Technical University, at Stuttgart. He recalled Kuske's reference to photoelasticity as a method of stress analysis, so we sought the professor's advice. As a result, we were able to prove by photoelastic techniques the soundness of the silo's design.

Having had the value of this technique demonstrated to us so clearly, we immediately established our own photoelasticity laboratory. It is still the only laboratory of its type in a private engineering firm in Germany. We not only do our own design analyses, but also do a considerable amount for other engineers and for contractors.

Method Saves Materials

We soon found that analyses through photoelastic studies were by no means limited to the proving of completed designs. We began to apply this tech-

nique to the study of structures in the design stage, and we have found it more valuable as we gain added experience month by month.

The general tendency in structural engineering is to large spans and live loads and at the same time toward a reduction of the sections of the bearing members. The coefficients of safety used by engineers when designing in steel and concrete are being reduced, too, as the result of the improvements in manufacturing methods and the development of more exact static calculations.

Shell structures of prestressed concrete and other unusual designs are now widely used all over the world. In Germany, for example, it is rare that one comes across a new concrete bridge that is not prestressed. The reason is that materials are very expensive in Germany, and the engineers must calculate sharply to save every pound possible. We no longer can afford to overdesign so far as materials are concerned, and prestressing is one approach that saves materials.

In order to gain these savings our engineers must make involved calculations. Static computations for a simple German family house might fill a hundred pages. The necessary calculations for a cement plant might take 1500 to 3000 pages. On the other hand, there are many structures for which calculations cannot be made accurately in this manner, no matter how lengthy. For example, different types of wall plates with holes or irregular slabs often are beyond analysis with conventional mathematical methods. Yet, consulting engineers must analyze and design these interesting and complicated construc-

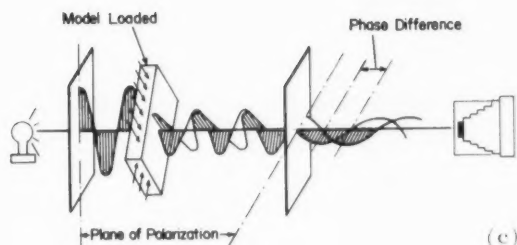


Fig. 1—At far left, both polarizer and analyzer have planes of polarization in same direction so light passes through to camera. At center, plane of polarization of analyzer is at right angle to that of polarizer and light is blocked off. When load is applied to model as at right, part of light passes through and part is obstructed; this forms black bands on the image, indicating stresses that are present in the model.

tions, and they must avoid the use of unsightly supports and awkward reinforcements.

Broad Range of Application

Since it is often impractical or impossible to design certain structures by conventional methods of calculation and to determine the exact extent and position of reinforcement required, it is fortunate that the engineer now has the science of photoelasticity at his disposal. Through photoelasticity he can make a full stress analysis of the most complicated structures.

There are almost no limitations in the application of photoelasticity by the structural engineer. It is possible to examine beams, supports, discs, plates, slabs, shells, or any other shapes. Moreover, the structure can be of concrete, steel, or any other engineering material, and either two or three dimensional problems can be solved.

There are several good books that deal with the theory and use of photoelastic analysis (see bibliography), and these should be studied by any consulting engineer interested in applying this method. The basic concept is, however, relatively simple and not even new, having been discovered by David Brewster (1815), who also saw the possibility for practical applications in engineering.

How it Works

A simplified diagram illustrating the way in which polarized light is used in the study of structural models is illustrated in Fig. 1. At the left (a), an unloaded plastic model of the plate being analyzed is shown in position between a polarizer and an analyzer. Light from a source to the left of the polarizer passes through the polarizer and then through the transparent model. When the planes of polarization of the polarizer and the analyzer are the same, the light also passes through the analyzer. But when the plane of polarization of the analyzer is at right angle to that of the polarizer, as shown at (b), then no light passes through.

When a load is applied to the model, the polarized light passing through it is split in two components that vibrate in the direction of the principal

stresses and travel through the model at different velocities. The two components are recombined in the analyzer, and where they are in phase, the light passes through as at (a). Where they are out of phase, the light is retarded as at (b) and black bands appear across the image. This condition is shown at (c). The loaded model will show on the analyzer a series of black bands, each band representing a contour of constant stress. These bands are called fringes, or isochromatics, and are a direct measure of the difference in phase of the two components of light and, therefore, are indicative of the shear stresses in the loaded model.

In practice, photographs are made of the banded images presented by the analyzer, and the stress study is made on the basis of data presented by the set of photographs taken.

Equipment Required

The consulting engineer, while interested in this theory, is even more interested in its application and the cost of the equipment required. The outlay for a small laboratory such as ours is approximately \$5000. The equipment is relatively simple, but it does require the attention of a skilled technician.

Essential facilities for performing stress analyses by photoelasticity include:

1. A polariscope consisting of a lamp chest with white and monochromatic lamps, polarization fil-

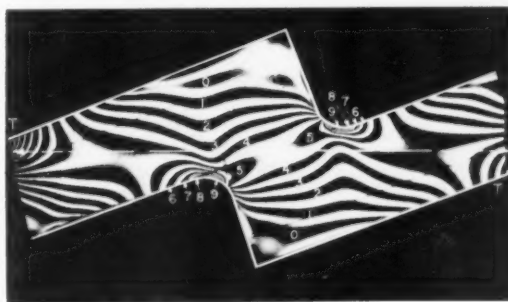


Fig. 2—Isochromatics indicating areas of stress show as dark bands on photograph of the model.

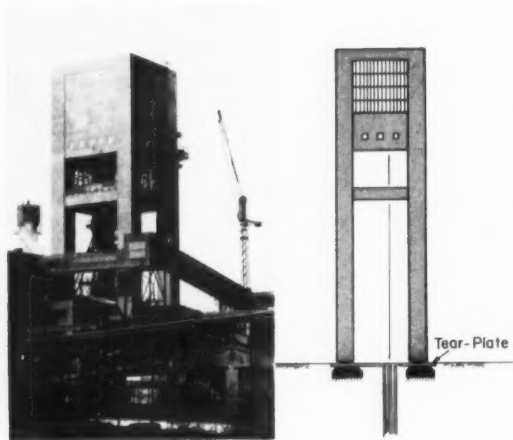


Fig. 3—Photoelastic techniques were used in the analysis of tear plate for this mine shaft frame.

ters, polarizer, analyzer, and quarter wave plates.
 ‡ Equipment for applying a load to the models, horizontally and vertically.

¶ A small workshop in which the transparent models can be prepared.

¶ A camera and a photolaboratory in which the films can be processed and the prints developed.

Preparing the Model

In analyzing stresses by photoelasticity, the first step is to make a model of the structural shape from some plastic material such as celluloid, plexiglas, or some polyester. It does not matter what thickness is used, but it must be uniform. About $\frac{1}{8}$ inch is convenient. The model must be prepared with care, and this takes considerable skill. However, a good technician can be quickly trained by manufacturers of the polariscope or others expert in the field.

The completed model then is placed in the polariscope and loaded in the same manner the actual structure will be loaded. This, again, is a technician's job, but it should be done under the supervision of the structural engineer.

Photographing Isochromatics

In preparing for the first photograph, which will show the isochromatics or fringes, quarter wave plates are used on each side of the model. Their purpose is to remove isoclinic lines, leaving only the isochromatics.

Under these conditions, if the light source is monochromatic, the isochromatic lines appear as black areas on the image. These are quite distinct, and the black and white photograph of these black and white bands gives a clear pattern that

makes it possible for the consulting engineer to accurately locate the stressed regions.

This is not sufficient, however, for identifying and numbering the bands. For identification of these, a white light is substituted for the monochromatic light. This gives a color differentiation for each of the isochromatic bands. This colored image on the analyzer will be less distinct than the pattern given by the monochromatic light, but the colors permit a matching of the bands of equal stress in the different parts of the model, for the areas of equal stress will appear in the same color.

When this colored image has been thrown on the analyzer, a color photograph of it is made, and this color photograph is studied together with the more distinct black and white photograph made with the monochromatic light. It then is possible to label the fringe lines in sequential order. These are numbered on the black and white photograph on the basis of the color guide taken from the color photograph. The bands that show black on the color photograph always are numbered "0," and then successive bands, each indicating a higher order of stress, are numbered. This is illustrated in Fig. 2. Note that here the fringe order, or isochromatic bands, run from 0 to 9, this ninth order indicating the locations of the greatest stress in the model.



Fig. 4—Photograph of model of tear plate indicates isochromatics developed under tension.

A concentration of isochromatics of high order indicates a concentration of stresses, and therefore, a critical point. The engineer can find the actual value of these stresses by multiplying the number of the isochromatic band by a stress optical coefficient and another coefficient that takes into account the scale of the model.

Photographing Isoclinics

These data then are put aside for later use, and a new approach is started. It is now necessary to photograph the isoclinics. These are the lines that appear when the loaded model is exposed to light that is passed through the polarizer and the analyzer but with the quarter wave length filters removed. These isoclinics are revealed one by one as dark lines. They appear and disappear as the polarizer and analyzer, with their planes of polarization at right angles as shown in Fig. 1(c), are rotated together through 90 degrees. At increments of 5 to 10 degrees, photographs are taken, and the isoclinics are plotted and numbered according to the angle of rotation from a base line. As the polariscope is turned through these increments, the lines shown at one angle disappear and are replaced by new lines. Thus, we can see the direction of the principal stresses at all points in the model. All

lines that appear at the same stage of rotation are given the same number on the plot.

A Typical Application — Plate Analysis

This technique can be made clearer by presenting an actual example. A mining company in the Ruhr area wanted to erect a new concrete shaft frame. Our engineering office got the project for the design, so it was necessary for us to make the necessary static calculations as well as the detailed plans.

Fig. 3 shows the scope of the now completed project. The four supporting columns contain the lifts, electrical distribution wiring, air and water piping, and a staircase. This whole shaft frame straddles a pithead, so it was necessary to position it on a horizontal plate and in that way fix the four supports. The plate had to be provided with a large circular hole over the pithead.

The plate would be subjected to tension forces in the event of settlement or movement of the soil. These forces could work parallel to the boundaries, or diagonally between the four supports.

We decided to analyze the stresses on this plate photoelastically, and a model was cut and loaded in position in our polariscope.

Following the prescribed methods, we photographed the isochromatics with the model under

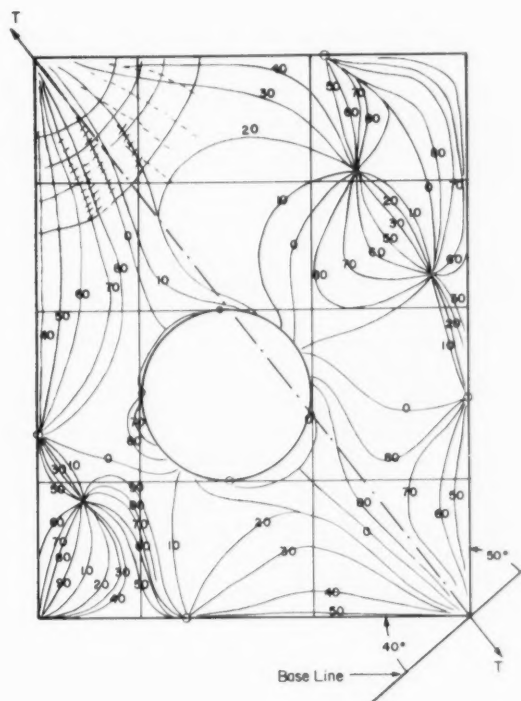


Fig. 5—As loaded model is rotated, isoclinics are plotted at each 10 degree increment of turn.

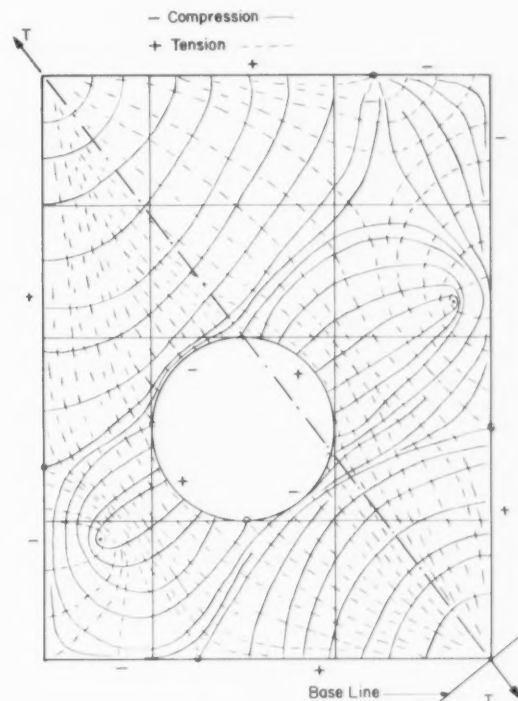


Fig. 6—Lines of tension and compression can be plotted from the isoclinics developed in Fig. 5.

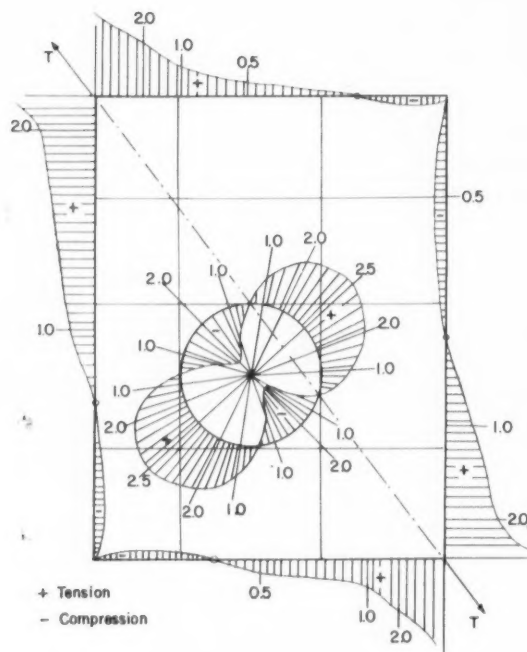


Fig. 7—On the basis of the data plotted in Figs. 5 and 6, this diagram showing the magnitude and the direction of the boundary stresses was prepared.

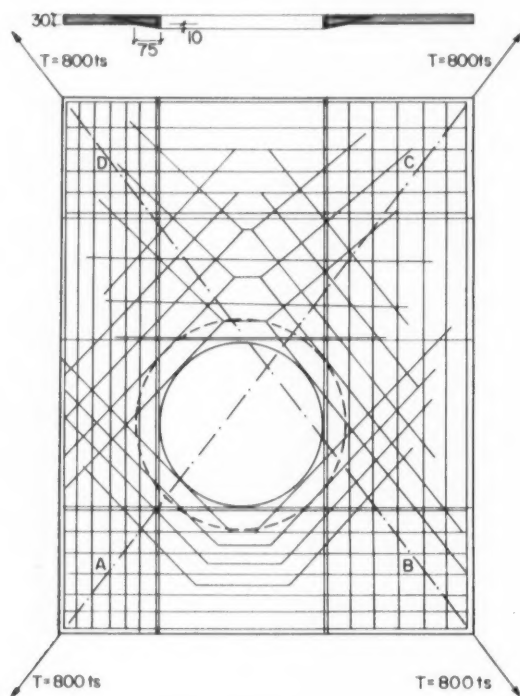


Fig. 8—Finally, this drawing was made to show the positioning of the reinforcing in the tear plate that satisfies the loading with a minimum of material.

diagonal tension forces. The photograph of these isochromatics, labeled as to the order of the stresses involved, is shown in Fig. 4. The highest order of stress in this instance is 2.5 at the rim of the pit-head hole. These orders of magnitude were determined from the color photograph.

We next proceeded to plot the isoclinics from the lines that appeared as we rotated the polariscope through 10 degree increments. This plot is shown as Fig. 5.

Plotting Stress Data

This completed actual work with the polariscope, but considerable additional analysis was required. From the plot of the isoclinics, we drew the lines of stress. This was done by plotting a number of short directional lines at regular intervals along the isoclinics. The inclination of these short lines was determined by the numbers shown on the isoclinics on which they were drawn. For example, the short lines on the "0" isoclinic were drawn parallel to the base line; those on the "10" isoclinic were drawn at 10 degrees to the base. At the upper left corner of Fig. 5 we have shown how these lines were plotted. When the plot was completed, it had the appearance of Fig. 6. Solid lines are lines of compression and dotted lines are those of tension.

Having determined the magnitude of the stresses by means of the isochromatics and having determined the direction of the stresses from the isoclinics, this information was combined in a diagram of boundary stresses (Fig. 7). We then knew not only the extent of the stresses, but their direction, and the engineer proceeded to use these combined data for his engineering drawing. The result is shown in Fig. 8 with all of the reinforcing properly positioned. This gives a design using the minimum of material and reinforcing for the assumed loading.

Apartment Building Wall Section

Another example of structural analysis through photoelastic methods is illustrated in Figs. 9-11. In a six-story apartment house, the architects wanted to avoid the use of any columns on the ground floor so it could be used for commercial rental space. The design selected for the cross section through the ground floor and the second floor is shown in Fig. 9. We made a plastic model of this, put it in the polariscope, and followed the proper analysis method. The diagram of stress lines that developed is shown in Fig. 10. From this we were able to design the best reinforcement arrangement for the section, as shown in Fig. 11.

Sometimes it is necessary to make use of special techniques, and much can be learned in the laboratory through experience, but these two examples given an idea of the approach used in the analysis

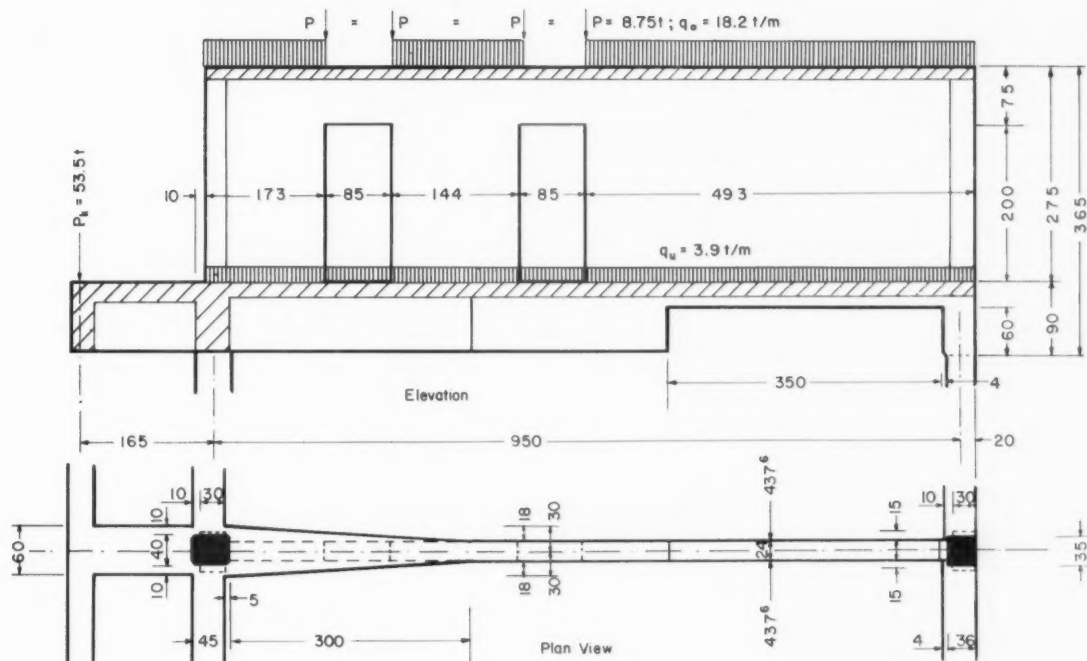


Fig. 9—Cross section through an apartment house showing loading on ground and second story supports.

of structures that would be extremely complicated if attempted by pure mathematical means.

Valuable Aid

Photoelasticity will not eliminate the need for all static calculations, but it does give the structural engineer a visual representation of the design and enables him to work with members on which the analysis could only be approximate with other means. In this way it is possible to arrive at the most economical structural design and to avoid exaggerated dimensions that so often are the result of engineering uncertainty. Fortunately, photoelasticity has been widely used in machine design, and structural engineers can benefit from the experience gained in that field. It offers us new methods—and interesting ones—that will grow in importance each year. ▲▲

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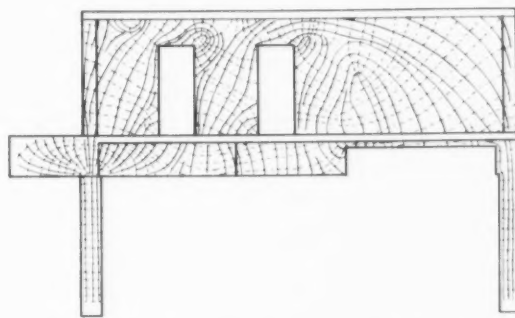


Fig. 10—Photoelastic analysis provided data that resulted in this diagram showing the arrangement of the tension and the compression stress lines.

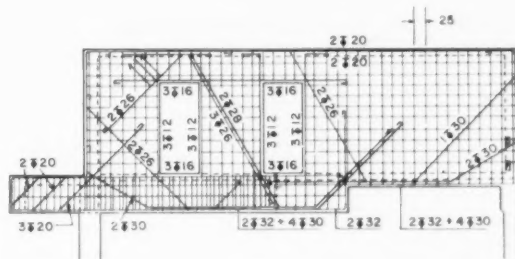


Fig. 11—The reinforcing rods were placed in the section in these locations to handle the principal concentrations of forces as shown above in Fig. 10.



Some freight elevators are big enough to handle a semi-trailer and its load. This one is rated at 40,000 lbs.

The Proper Approach To . . . Freight Elevator Design

GUSTAV B. GUSRAE, P.E., Consulting Engineer

THE FREIGHT ELEVATOR, the work horse of the elevator family, is seldom seen by the public. Invariably hidden in the most remote and least desirable corner of a building, abused and neglected, it lives a solitary life in its small, frequently cheerless world. In contrast with the glamorous, pampered passenger elevator, it is called upon to bend its back repeatedly to the heaviest of loads; to be pulled, pushed, scratched, torn, scraped, and bent till it ceases to resemble its original self. Nevertheless, with adamant tenacity it continues to perform its fundamental service, disregarding its

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shabbiness, its bruises, and its unsightly wounds.

This work horse is called upon for a great variety of jobs. Many varieties of freight must be handled in warehouses, factories, and office buildings. In addition, special elevators are used in public parking garages, for sidewalk lifts, and as loading platform levelers—and there are countless machines individually designed for unusual tasks.

Types of Loads

When a consulting engineer is called upon to design a freight elevator, he first must investigate the type of material to be carried. The type of ma-

material will determine the shape and size of the elevator. The material may, for instance, consist of 16-ft pipes, 20-ft automobiles, bales of paper, or 4-ft diameter cable reels. The space required for a logical arrangement of the material on the proposed platform, plus reasonable room for the men handling the material, will determine the shape and size of the platform. This is not always obvious, and it deserves thorough study.

The type of loading will influence both the size of the platform and the load rating of the elevator. Material may be palletized or the load may consist of a variety of separate items—it might even be bulk. It may be loaded onto the platform manually, by hand trucks, by motorized industrial trucks, or by means of some special conveyor. The materials may be loaded piecemeal or the entire load may be placed on the platform at once. This is important for when materials are loaded in increments, forces are set up that tend to overturn the platform in the direction of either the heaviest or the first increment loaded. When the loading is by means of industrial trucks, the weight of the truck must be considered, for the elevator must be able to handle the additional weight during loading. Occasionally, the elevator must carry both the industrial truck and its load from level to level.

Load Ratings

Freight elevator loadings fall in three classes:

¶ Class A—General Freight Loading, where the load is to be well distributed on the platform and the weight of any single piece of freight is not more than one-quarter of the rated load of the elevator.

¶ Class B—Motor Vehicle Loading, where the elevator is to be used solely to carry passenger automobiles or trucks.

¶ Class C—Industrial Truck Loading, where the load is carried onto the platform by means of industrial trucks having a loaded weight in excess of one-quarter of the rated load of the elevator, or where the load is for some other reason undistributed to this extent.

The class then determines the minimum acceptable load rating, and in addition, unusual loading may call to the designer's attention the need for brakes, locking mechanisms, and operating devices as well as auxiliary counterweights.

To permit the proper design of the platform, the car-frame, the guide rails, and the safety, it has been accepted that the minimum rated loads based on the inside net area of the elevator platform should be:

¶ Class A loading—50 pounds per square foot

¶ Class B loading—30 pounds per square foot

¶ Class C loading—50 pounds per square foot

In addition, for Class C loading, the capacity of



Design of a freight elevator depends on how it will be loaded. This small electric-powered hand truck and its load can fit into General Freight Loading category.

the machine brake and the traction equipment should sustain at least 150 percent of the rated load of the elevator.

These are the minimum requirements. Should the anticipated load exceed the minimum load rating, the design load rating must be adjusted to a higher value that would include a reasonable allowance of 30 to 50 percent to insure sufficient carrying capacity of the elevator.

In brief, the establishment of a load rating for a particular project requires that the consulting engineer must determine:

¶ The type of material to be carried

¶ The shape and size of platform required

¶ The net inside area of platform

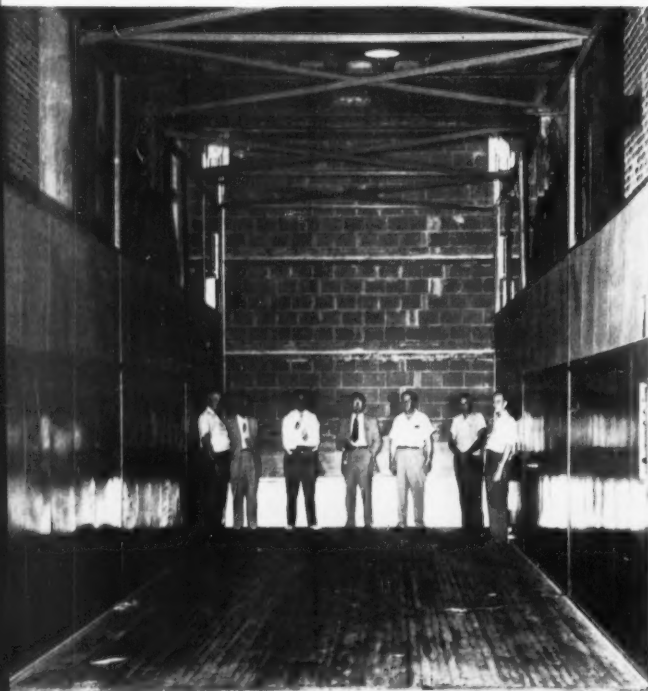
¶ The class of loading

¶ The minimum load rating

¶ The anticipated weight of the actual load, plus an allowance.

The load rating used in design then is either the minimum or the actual rating, whichever is higher.

In freight handling operations, loading usually takes a long time. An equal amount of time is consumed in unloading. In warehouses, loading and unloading often takes 20 to 30 minutes, and a saving of 30 seconds in the round trip time is not



This huge freight elevator installed in the Southern Furniture Exposition Building is nearly 20-ft high.

significant. Speed, therefore, is not as important as it is for passenger elevators, where the loading and unloading is relatively rapid.

Slow speed has some advantages. Speeds of less than 350 fpm permit the use of less expensive geared machines and less expensive associated equipment. Lower speeds also allow the designer to specify two-to-one roping which for freight elevators is very advantageous. For example, the application of two-to-one roping would permit the use of a considerably less expensive 5000-lb machine to lift 10,000 lbs at half speed.

Freight Elevator Speed

Freight elevator speeds of from 50 to 100 fpm are quite common but speeds exceeding 150 fpm with two-to-one roping are unusual. Smaller freight elevators with 3000- to 4000-lb load rating, using one-to-one roping, may have speeds as high as 350 fpm if that relatively high speed is justified.

Higher speed freight elevators are installed in tall office buildings where small freight is distributed throughout the building as a regular service. Some of these elevators have speeds in the

range of 800 fpm, but they are little more than passenger elevators relegated to freight service.

Hoisting Machinery

Limiting the freight elevator speeds to a maximum of 350 fpm with one-to-one roping or 150 fpm with two-to-one roping permits the use of the less expensive worm gear single wrap traction machine. The great majority of freight elevators and practically all freight elevators in plants and warehouses have this type of drive. The machine consists of a cast or structural bedplate on which are mounted an electric motor, a brake assembly, a worm and gear, and the driving sheave. The electric motor turns the driving sheave through the worm and gear. The motor of the worm gear machinery may use either direct or alternating current.

Higher freight elevator speeds demand the more expensive gearless machine, where the electric motor operates the driving sheave directly, without the intervening worm and gear. The motor of the gearless machine always is energized by direct current obtained from a motor generator set that provides variable voltage control.

Leveling the Platform

If industrial trucks or carts are used in loading freight elevators, good automatic leveling is indispensable, and elevators of the automatic, self-service type must have good leveling regardless of the loading method.

There are a number of methods to provide satisfactory automatic leveling—and an equal number of systems offering only illusory pseudo leveling. A certain amount of experience is required to separate the good from the bad, just as with most commercial equipment the consultant is called upon to specify.

The initiation of leveling from the controller in the machine room is normal and acceptable, but the final leveling, for best results, should be by means of equipment in the hoistway at each landing. Furthermore, stops and leveling should be initiated by separate lines of "up" and separate lines of "down" relays on the control board. Some manufacturers have acquired the habit of juggling the control equipment in an attempt to force one line of relays to perform all manner of conflicting or impossible functions.

Leveling is an operation that requires some compromise. Whereas perfect leveling at each stop is desirable, such excellence is as rare as a live hero. Leveling within the limits of $\pm\frac{1}{8}$ inch generally is considered about as good as can be obtained and consistently maintained.

In addition to normal automatic leveling with the various floor levels of a building, it is often

necessary for the elevator car be capable of being brought up to the level of the bed of an industrial truck backed up against the hoistway opening. To do this the elevator car must be raised two to three feet above a landing level when both the car gate and the hoistway doors are open.

For this purpose inching buttons can be provided: one button for up-travel and one button for down. The car will move while the button is kept in a depressed position. Releasing either button will stop the car.

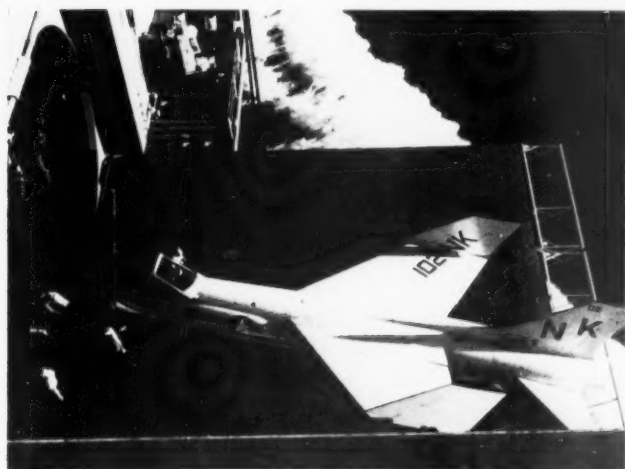
Inching buttons must be connected to bypass both the hoistway door interlock and the gate contact circuits so the car can be operated with open doors but at the slowest possible speed.

A deep toe guard must be provided when inching buttons are used. The toe guard is mounted on the car sill to seal the open space between the landing level and the raised car. The guard is usually 6 inches longer than the maximum height to which the car platform may be raised above the landing level. For a 3-ft maximum car platform rise, the depth of the toe guard must be at least 3 feet 6 inches. The deep toe guard requires rechecking of the pit depth at the bottom of the hoistway. The pit must be sufficiently deep to provide space for the guard when the car rests in the pit on the compressed buffer.

Machine Controls

To obtain good leveling with smooth starts and stops, the consulting engineer's specifications must stipulate the proper motor control.

The best results are obtained with variable voltage control. The leveling will be within $\pm \frac{1}{4}$ inch,



Mammoth aircraft carrier elevators must be designed for rugged sea duty, include special control equipment.



Industrial trucks set up severe eccentric loads on the elevator platform during loading, unloading operations.

the starts and stops will be smooth, and there will be compensation for the variations resulting from stretch of the hoisting ropes under various loading conditions. But this type of control is expensive. It is mandatory, however, for elevator speeds over 100 fpm, for it is the only control capable of performing properly at higher speeds.

The less expensive alternating current, two-speed control, or the direct current, multispeed resistance control may be used for speeds of less than 100 fpm, but the results are less spectacular than with the variable voltage control. Leveling will vary as much as an inch under different load conditions; starts and stops will be more abrupt; and there is no compensation for hoisting rope stretch.

Alternating current single speed control or the simple direct current resistance control, the least expensive types, will give the poorest results, with abrupt starts and stops and undesirable leveling limits varying two to three inches in each direction. The sudden stops will tend to wear out the equipment at a relatively rapid rate, particularly the brake mechanism and the brake lining. This control is used only where dictated by first-cost lim-

itations. Inching buttons must be provided to permit the juggling of the elevator car to a reasonable level for loading.

Where the leveling is poor, a special adjustable trucking sill can be employed. The sill will bridge the car platform and the landing, permitting loading and unloading on a grade.

Freight Elevator Operation

For years all freight elevators were operated by attendants, and considerable resistance was encountered in attempting to apply automatic, self-service types. The theory was that an attendant is indispensable to the orderly loading and unloading of the freight and as a guard against the misuse of the equipment.

Yet, today, practically all freight elevators are designed for self-service operation by means of push buttons but with some provision for operation by an attendant where desirable. Basically, the function of the attendant is that of chief button pusher, the car performing the starts, stops, and leveling automatically.

Where the loading and unloading occupy relatively long periods of time, and particularly where loading is such that the entire car is occupied during one loading operation, the simplest automatic self-service operation as represented by the single automatic push button is the most desirable. The entire sequence of loading, start, stop, leveling, and unloading will be uninterrupted because the car will not respond to any other calls until the sequence is completed and the car is free.

Where the loading and unloading times are short, and particularly where the car is only partly occupied by the freight during any one floor loading, and space is available for service at other floors, the more expensive, double button collective automatic self-service operation is better. With this the car will respond to other calls and will permit additional loading and unloading at other floors after the original load has started to its destination.

Automatic Door Operation

Automatic door operation usually is incorporated in the controls, with hoistway doors of the vertical bi-parting type. One set of doors consists of two panels, one panel sliding upward and the other sliding downward to open. The car gate is generally a single high panel sliding upward to open.

With automatic door operation, both the hoistway doors and the car gate open automatically upon arrival at a floor. The doors and gate remain open to permit the unloading. The doors and gate will close only after the "door close" button in the car is pushed, and removal of the finger from the button before the doors have fully closed will stop them.

This safety feature has prevented many an accident.

Another safety feature is the sequence door operation, where the car gate closes before the hoistway doors begin to close. In opening, the hoistway doors open before the car gate begins to open. As a further precaution the bottom edge of the car gate can be equipped with a sensitive edge designed to reopen the closing car gate in the event the gate is obstructed while closing.

Additional Considerations

These basic design and specification requirements are complemented by the selection of the most desirable components such as car-frames, guide rails and shoes, platforms, cabs, floorings, hoistway doors and car gates, operating fixtures, counterweights, buffers, roping, special safety devices, and the multitude of items that go to make up an installation.

The consulting engineer will find that warehouses, factories, garages, and similar buildings generally use large 8000- to 20,000-lb, slow speed, single wrap, traction type elevators with two-to-one roping. Most popular are the single automatic self-service push button type with provision for attendant operation.

Hotels, hospitals, office buildings and similar structures generally use smaller, 3000- to 6000-lb higher speed, variable voltage control, worm gear or gearless type elevators with either one-to-one or two-to-one roping. Generally they are of the double button, self-service collective type with provision for attendant operation.

Freight elevators are built in a great variety of sizes but except for special service the platforms seldom are more than 12-ft wide and 20-ft long. A very popular size for factories is a platform 8-ft wide and 10-ft long.

Special Applications

There are, of course, numerous special designs. Freight elevators used on aircraft carriers for carrying planes to the deck level have load ratings of 80,000 pounds. Special devices are provided to start, stop, and to level this huge platform. The difficulties involved in controlling the movement of nearly 200,000 pounds despite the roll of the ship, the assault of stormy seas, and battle conditions can be easily appreciated.

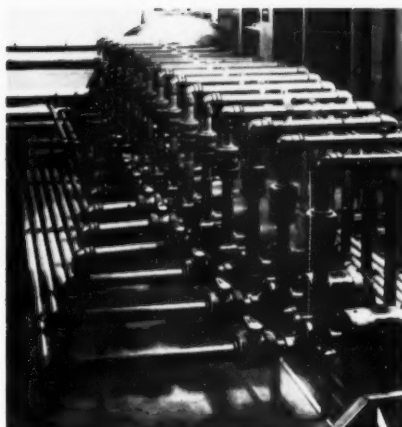
A rather unusual application of elevators has been made in some factories where the car has been furnished as a complete floating office permitting the executive to keep in constant touch with the operations and the employees at every floor of the plant. In fact, here we approach glamour, and that hardly fits with the concept of the freight elevator as being the work horse of vertical transportation. ▲▲

IN THE INDUSTRIAL FIELD...

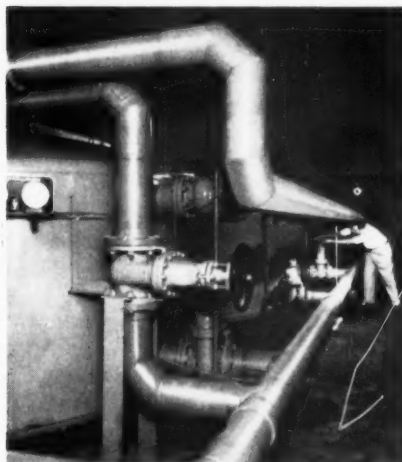
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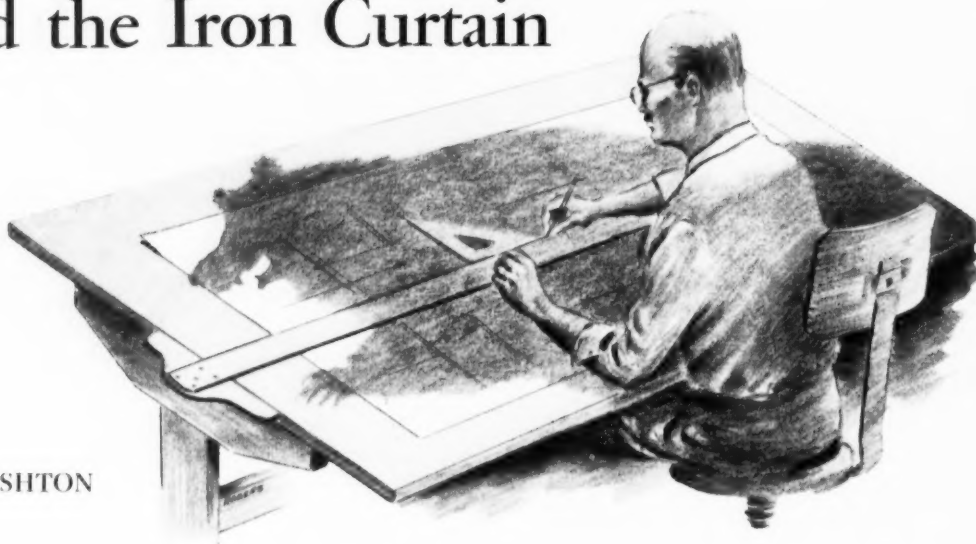
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Consulting Behind the Iron Curtain

JOHN ASHTON



IT IS IMPOSSIBLE to report on conditions of private practice behind the Iron Curtain in Czechoslovakia because **Cexclusive** there is no private practice in that part of the world. There are, however, consulting engineers in one sense, for there are men who do the same type of work that is done by consulting engineers in the Western nations. They do not work on a fee basis; instead, they always work as employees of the government. True, some of them occasionally receive percentage fees, but these fees, too, come from the government.

Czechoslovakian projects begun by private owners amounted to about 26.5 percent up until 1952. Since that time, private operations have been greatly diminished, and now they are not more than 7 percent of the total. In fact there is scarcely any work of importance that a Czech consultant could undertake for a private client.

With it fully understood that there are no engineers in Czechoslovakia in private practice, we still can refer to engineers who do design work for new civil, structural, mechanical, and electrical projects as consulting engineers, if only by analogy. That we will do in the remainder of this report.

Czech consulting engineers are not all members of one single organization, but according to A. Vaverka, one of the country's leading engineers, they are grouped in a number of semiautonomous organizations, roughly the equivalent of our

Founder Societies in the United States. These technical societies work closely with the Academy of Sciences at Prague which, in itself, supervises most professional aspects of engineering practice.

The Prague Academy also educates engineers and establishes qualifications for practice. This Academy deals only with engineering and architecture, as opposed to the Prague University, which trains doctors, scientists, philosophers, and lawyers.

Code of Ethics

Czechoslovakian engineers operate under a most interesting code of ethics which, in practice, is quite similar to the familiar codes of the United States, but it differs in that it is not in written form. Instead, it is verbally taught to students and interpreted by the Academy of Science board. However, it is, from a legal viewpoint, the same as the general code of the People's Republic of Czechoslovakia having to do with labor conditions for all classes and professions. Violations of the code of ethics are punished by the Academy on the sole judgment of its members and according to their interpretation of the case.

Ethical standards of the profession are taught at an early stage to all engineering students and form part of the final examinations imposed upon young engineers by the Academy before they are accepted as practicing engineers. The Czech engineer then is expected to live strictly under this

code of ethics, and in case of severe infringement, sentence is passed by the State's supreme court. Minor violations of the ethical code are settled by the Academy itself, which normally removes the offender from its list of engineers. This does not mean that the punished member is no longer permitted to practice, but a supreme court verdict puts a full stop to further activity in the profession.

Czech consulting engineers, despite the fact that they are really government employees, have no fixed salary or percentage on which they can rely. Percentage fee schedules vary from year to year and according to the various technical specialties. They are set not by the engineer's technical society but by the government after consultation with the Academy of Sciences. However, engineers do not suffer financially in comparison with other workers in Czechoslovakia. They have top incomes in comparison with other workers, as in most Communist countries. While they get almost nothing from private practice fees, they do receive special government subsidies.

Collaboration With Soviet Russia

Since Czechoslovakia is a satellite nation, it is quite normal that many Czech consulting engineers are called from time to time to aid the Russians in industrial development projects. This is all the more logical since Czechoslovakia's own industry is highly developed and Czech engineers have long been known for their knowledge of such projects as those involving hydroelectric development, mining, and nuclear energy.

An exchange of technical information and planning forms part of the existing agreements between Czechoslovakia and Russia as well as the other satellite countries. Engineers often are sent by the government to Russia and other Communist countries for special consultations. On the other hand, Russian experts sometimes are called in by the Czech Academy or the Czech government and work with the local engineers. That is the way the work was done on the Slapy Dam, which currently produces 325 billion kwh.

There is not much direct communication between consulting engineers or any other engineers in Czechoslovakia and those outside of the Iron Curtain. The Prague Academy does belong to some international technical organizations, and there are a few engineers in Czechoslovakia who belong to some British and American technical societies. This type of cooperation is strictly controlled, but it is in some aspects being encouraged through the president of the Academy, Mr. Nejedly.

In the past few years, quite a number of Czech consulting engineers, particularly mining and hydro-

electric development specialists, have been called upon to take charge of work in the Far East and the Middle East—particularly in Egypt where a number are working with Russian specialists on the Aswan Dam. Also, Czech engineers have been doing a little work in India, but they have found that they are unable, generally, to compete with American, British, or German consultants.

Typical Work on Home Front

Within Czechoslovakia, there has been much concentration recently on hydroelectric power development, and this has occupied the efforts of a number of consulting engineers. Construction of power stations, according to our informant, underwent a great upward development after 1945, with eight dams being built in the 10 years following that date. This involved only three major projects, but these have a storage capacity almost 18 times as great as the 16 dams that existed before World War I.

Besides this construction, the Czechs have planned seven new dams, to be completed by 1960. Two other dams also are under construction, as are a number of minor dams.

Most of the money spent on heavy industry in Czechoslovakia since the war has been for the erection of power stations, mining centers, and mineral development. Czech engineers played a major role in this field, and their technical knowledge has served to provide modern methods of production and special machinery suited to local conditions in their country.

From all that can be learned, the Czech engineer, so far as technical ability is concerned, is about on a par with his European colleagues in the West. He is, however, most unfortunate in being restricted by government control and the police state conditions imposed upon him as an individual and as a member of a profession. There is no question that a great many Czech consulting engineers who were in private practice before the war are no longer contented with their lot, and they feel much restricted as government employees.

Many of them do not feel that they can develop their personal capacities as much as they should because of their inability to exchange views and experiences freely with their colleagues in the Free World. They do study Western publications intensely and learn much from them, but this is less than they would like. They claim that this has no bad effect on their technical progress; they say they learn much from their Russian collaboration. But many Czech engineers regret profoundly the lack of an ever-widening horizon which would enable them to profit from the friendly collaboration of foreign colleagues in the West. ▲ ▲



Verner Z. Reed

A dowser, with his divining rod, searching for water

How Water Witching Works

EVON Z. VOGT
and
RAY HYMAN

*While we worry about fall-out and space travel, there are still at work in the United States some 25,000 busy water dowsers employed by hundreds of thousands of farmers searching for the right spots to drill wells. Evon Z. Vogt and Ray Hyman have just completed a thorough study of water witching, and they report here on the current state of the art. This article is taken from their new book *Water Witching U.S.A.* which not only deals fully with this subject but also explores related phenomena such as hypnosis, mind reading, talking horses, and Ouija boards. To balance this, the book's appendix contains an excellent report on scientific methods of locating ground water written by H. E. Thomas, of the U.S. Geological Survey. This book is soon to be published by the University of Chicago Press, and this article is preprinted with their permission.*

JEFF GREEN seems like a man in a trance. His head is bent forward, and his eyes are focused upon the junction of the two forks of the peach limb that he holds in his hands. He clutches one fork of the branch in each hand in such a way that the junction points almost straight up in the air. For the past half-hour he has been pacing back and forth over Frank Brown's pasture. Suddenly the peach limb quivers, and, as Jeff moves forward a few paces, it twists in his hands and points downward with such violence that the bark peels off.

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Jeff looks up and smiles at Frank Brown. "Dig here," he says, "and you'll find the water you need."

Jeff has just given an exhibition of the ancient art of water witching, otherwise known as "water divining," "dowsing," "smelling," "witch wriggling," and by a variety of other terms. His divining rod has just indicated a site at which Frank Brown hopes to find an adequate supply of underground water. Frank Brown is aware that the government men frown upon this practice. But he needs water desperately. When his two previous attempts to drill wells produced only dry holes, the county

agricultural extension agent could respond with nothing more helpful than "Maybe you'll have better luck next time." So Brown, in desperation, sought the aid of a neighboring farmer and water diviner. Jeff Green was an old-timer in the county and had a reputation for successfully witching hundreds of wells. To call upon him seemed, under the circumstances, the sensible thing to do.

All over the country, rural people seek out the diviner in just such situations as this. So great is the demand for the services of the diviner that an estimated 25,000 diviners are actively plying their trade in the United States today.

Water witching would be worth studying if only because of its widespread popularity among the rural population. But our curiosity is piqued by the additional fact that the practice is considered an outcast by orthodox science. Geologists, water engineers, government officials, and other scientists have opposed this unorthodoxy ever since it became popular some 400 years ago.

A Highly Controversial Subject

Few subjects arouse such vigorous and emotional debate as the question of the validity of water witching. Undoubtedly there are still communities in which water witching is simply taken for granted. However, because the scientific opposition has made inroads into the rural community and because the practice itself has been called to the attention of the general public, many people have discovered that they are *for* witching or *against* it. The response of the county agricultural extension agents in our study, some of whom are diviners themselves, reflected this controversy. In our sample, 56 percent of the agents expressed outright disbelief in the validity of witching, but as many as 20 percent admitted that they believed in its efficacy, and the remaining 24 percent indicated an open mind on this issue.

With our curiosity further aroused by this controversy, we set out to learn what we could about water witching. We went first to the published literature to find what is known about the origin and spread of the practice, hoping that this would give us some perspective on its persistence in the contemporary United States. In the literature, also, we found reports of investigations that shed light on two basic questions: "Does the divining rod in fact find water?" and "What makes the rod move?"

To answer our questions, therefore, we designed a study which would obtain comparable information from all parts of the country. We mailed a total of 500 questionnaires to a stratified sample of county agricultural extension agents. These agents were sampled from 3017 counties (the number of counties in the United States that have an agricul-



Clarence V. Elliott, of Los Angeles, demonstrates his personally designed water witching equipment.

tural extension service) containing 91 percent of the total United States population.

Our initial request plus one follow-up letter resulted in a response from 72 percent of our sample.

Besides information from questionnaires we gathered other kinds of data. We interviewed and observed diviners in action in New Mexico, Massachusetts, Nebraska, West Virginia, New Hampshire, and New Jersey. We talked with many more people who had witnessed the practice in other parts of the country. We carried on a voluminous correspondence with diviners or people who knew diviners all over the world. Many friends throughout the country kept us well supplied with newspaper clippings and articles on water witching.

These data, taken together, provided us with a much clearer view of the patterns of water witching in the United States. The basic survey data, when combined with census, geological, and meteorological information and coded and punched on IBM cards, gave us answers concerning the extent of water witching and the conditions under which it is practiced in this country. The data further supplied us with information concerning who the diviner is, how he rationalizes his practice, and what beliefs and folk sayings about water witching are current.

Case Histories and Field Tests

Does water witching work? We would like to give a simple answer to this question. However, dif-

ficulties appear at once, for this question has a wide range of interpretations.

The strongest argument for water witching comes from case histories of situations in which water witching was successful in solving a real problem. Such evidence comes in the form of eyewitness accounts and testimonials, secondhand accounts, accounts by the diviners themselves, or records kept by a governmental agency. The three books by Kenneth Roberts on Henry Gross [the water dowsers] are full of such stories about how the diviner again and again comes to the rescue of people who need water.

The basic feature of these testimonials is their appeal to our faith in human integrity and credibility. "I was there. I saw it with my own eyes, and 'seeing is believing.'" The narrator is usually sincere and willing to swear to the truthfulness and accuracy of his report. The listener is hesitant to question the fidelity of the report for fear of insinuating that the speaker is untrustworthy. The speaker, for his part, becomes quite defensive if his report is not accepted at face value.

Case Histories Are Not Evidence

Yet, to the man of scientific training, such testimonials and reports cannot be accepted as evidence. This is not because he distrusts the layman. Rather, it is because the scientist, from bitter and often embarrassing experience, has learned that such testimonials are subject to inherent weaknesses and unconscious distortions. They violate

almost every standard of sound scientific observation. The flexibility of the case-history approach is such that the believers can use it to make an airtight argument for their cause, and the skeptics, with equal success, can use the same procedure to prove that water witching is nonsense.

There are many reasons, then, why case histories do not qualify as evidence. The very minimum that would be required is that an objective record be kept of all well-sinkings in a community and of the results obtained. Such a record would at least meet the objection that people naturally tend to report the good cases in support of their arguments. We can find only two occurrences of such records. One is from Fence Lake, New Mexico where a record was kept of well-sinkings in 1952. The results show that of 49 successful wells drilled, 24 were divined and 25 were not divined. Of the dry holes, five were divined and seven were not. There is no significant difference between the percentage of successes among the divined wells (83 percent) and the nondivined wells (78 percent).

Another record was kept of results of well-sinkings in Central New South Wales between 1918 and 1943. The number of cases is much larger, but it tells us the same story. Indeed, the percentage of absolute failures among divined wells is almost twice the percentage recorded for nondivined wells in this series.

We should say that these comparisons may not be as fair as they seem. We don't know enough about the conditions under which the diviner was called



David Dellarport



David Dellarport

in as compared with those when he was not. It may be that the diviner is used only in places where the water problem is exceptionally difficult, but the two sets of data illustrate that even when objective records are kept, the case-history approach is incapable of providing unequivocal evidence for or against the efficacy of water witching.

Evidence From Field Tests

Even defenders of water witching realize the deficiencies of case histories. And so they point to evidence that they feel is more experimental in nature. Such scholars as Barrett and Besterman (1926) and Henri Mager (1931) rest their cases upon a series of situations that they call "experiments." These "experiments" are what we will designate "field tests." In these field tests, the diviner is observed as he operates under natural conditions. The observations differ from those of case histories in that the diviner is performing for the specific purpose of having his abilities tested. And since this is a test, the observations and records are usually free of the defects that beset accounts of case histories.

But, despite the claims of some people, these field tests cannot be put in the same class with what a scientist calls an "experiment," for the field test, like the case history, suffers from a very serious drawback. Neither the field test nor the case history provides us with an adequate base line against which we can assess the diviner's ability. No matter how unusual or remarkable the feats of a diviner

may appear in these tests, they cannot be assessed scientifically unless we know what someone other than the diviner might have accomplished under the same conditions. Without this control, the evidence provided from field tests will always be inconclusive. The results that convince the believer can always be "explained away" by the skeptic on other grounds.

Let's look at an actual example. Barrett and Besterman present us with what they call "three notable experiments in dowsing." Each of these they selected as having special weight in demonstrating the reality of the water witching phenomenon. We will present one of these "experiments" to illustrate how the argument goes.

After examining all the available evidence for witching, Sir William Barrett decided that what was needed was a field test conducted under his personal supervision. Elaborate precautions were taken in preparing for the test. Barrett made sure to select a geological site that would be unfamiliar to the diviner. He then brought the well known British diviner, William Stone, to the site — a mountainous area south of Dublin, Ireland.

Stone's rod pointed out two spots that would yield water and another one that would produce a dry well. Three weeks later another diviner independently traversed the same field and substantially repeated Stone's selections. Barrett then drilled at these spots and found water in the two spots, as predicted, and no water in the third spot, as predicted.

Two geologists each told Barrett that they considered such a performance, by a man not trained as a geologist, to be quite remarkable. Armed with these opinions, Barrett was quick to decide that "the possibility of the dowsers' success being explicable by geological observation" was thereby ruled out. And he sums this test up as follows: "We have thus an experiment which conclusively proves the reality of dowsing."

Here we see the necessary weakness of all field tests. Barrett's whole argument rests on the unwarranted assumption that the diviners used no geological clues. He uses the opinion of two geologists as his guide. A scientific experiment would never let the matter rest on "opinion;" it would have made sure, by experimental controls, that the possibility of such clues was ruled out. Because such controls were lacking, the results are inconclusive.

To show how this substitution of opinion for scientific control creates ambiguity, let us see how



David DeHartport

This series of three photographs shows how the dowsing rod dips using the standard palms-up grip.

Here's how two divining rods can be made to move in opposite directions by rotating wrists outward.

another geologist, Gregory (1928), views the results of this same test. "Sir William Barrett was emphatic that Stone paid little attention to the surface features," Gregory comments, "but the line he chose was that which I think any person experienced in finding water would have selected from obvious surface indications."

Limitations of Field Tests

The field test approximates the ideal of scientific observation in that the diviner performs in front of observers who are watching with an intent to make an objective record. The departure from the scientific ideal occurs, however, when it comes to deciding how successful was the diviner's performance. At this point, a subjective, intuitive judgment is substituted for an objective standard.

Experiments such as these merely illustrate what scientists have known all along: the human being is a poor assessor of the operation of chance. He has a tendency to see order where none exists, to see departures from chance where only chance is operating, to see miracles where only laws of probability are operating. It is for this reason that the field test only partially approximates the necessary conditions for adequate proof.

Evidence From Field Experiments

The field experiment is something quite different. It is similar to the field test in that the diviner is observed in action in his natural working habitat for the purpose of evaluating his ability. It differs from the field test, however, in that the experiment is conducted in such a way that a meaningful base line is provided against which we can compare the diviner's performance. The base line may simply be the number of successes made by independent judges who find spots without the aid of a rod.

An excellent example of an experiment with such base lines is the one performed under the auspices of the American Society of Psychical Research (Dale *et al.*, 1951). The investigators ran the experiment in such a way that two base lines were provided. They were able to make one comparison of the diviner's performance against a chance base line; they made another comparison of the performance against the indications of two ground-water experts who were not diviners.

The experiment took place in Maine during the first week in August 1949, when the "relative drought insures the absence of surface water." The field was carefully chosen, so that such cues as

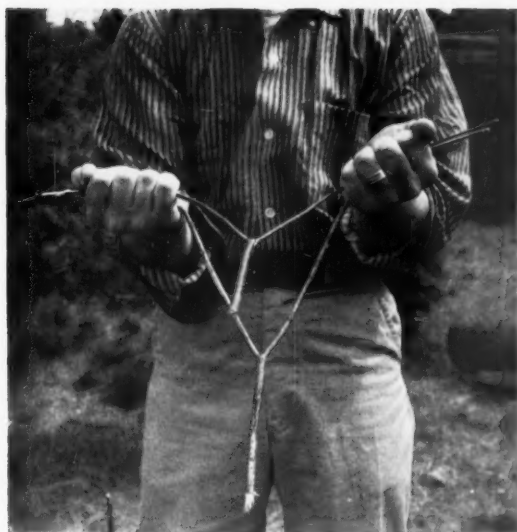


David DeHartport

surface water, wells, and other indicators of the presence or absence of water were absent. Each diviner witched the field in his own manner and selected the "best" spot for sinking a well. He was asked to estimate the depth as well as the amount of water found at this spot. He then went through his procedure a second time but with a blindfold placed over his eyes. All told, the experimenters ran a total of 27 diviners (22 men, four women, and one adolescent girl), one at a time, through this same process.

As a control, two "experts," a geologist and a water engineer, made estimates of the depth and rate of flow of the underground water at 16 different points which had previously been staked out on the field. These experts made their estimates by "relying upon normal utilization of facts about underground water."

Test wells were then sunk at each of the spots assessed by the diviners and the experts; the depth and the amount of water were measured for each well. The results showed that the experts did a good job of estimating the over-all depth of the water as well as the depth at specific points. Neither expert did a good job in guessing the amount of water to be found at specific points, although the engineer made a close guess on the over-all estimate of the rate of flow. The diviners, on the other hand, were complete failures in terms of estimating the depth or the amount of water to be found at their selected spots. There was no correspondence between their estimates and the geological facts. This was true not only for the group as a whole but also for each diviner as an individual. As the authors put it, "Not one of our diviners could for a moment



David Delfarport



David Delfarport

be mistaken for an 'expert' . . . We saw nothing to challenge the prevailing view that we are dealing with unconscious muscular activity, or what Frederic Meyers called 'motor automatism!' This experiment is the only one that we know about where an adequate number of test wells were sunk so that a legitimate statistical evaluation could be made.

Experiments in the Laboratory

Laboratory experiments differ from field experiments in that they are conducted within a laboratory setting. This means that greater control over extraneous variables can be obtained than when the experiment is conducted in a natural setting. Under the controlled conditions of the laboratory it is much easier to provide an objective base line for comparison. And because the experimenter has considerable leeway in manipulating the environment, he can have greater confidence that no factors other than those under investigation have influenced the results. Laboratory experiments on water witching typically involve single diviners. Experiments are performed in which the diviner is given a chance to prove that certain of his claims are in fact true.

Let us look first at the cigar-box test of Williamson (1938). Williamson is a consulting geologist who specializes in finding oil. Over the past 20 years he has had a standing offer to diviners who claim to find oil. If a diviner, or doodlebugger (as he is known in the oil industry), can convince Williamson that his rod consistently responds to the presence of oil, then the geologist and his associates will back him in oil-prospecting with financial help and other resources. To each person who accepts

the challenge, Williamson presents the following test: Ten cigar boxes are placed before the diviner. Each cigar box is filled with sand. In one of the boxes a bottle of oil is buried in the sand. If the rod can respond to oil that is several hundred, or even thousands, of feet in the ground, Williamson argues, then it should easily detect oil that is only a few inches away. The diviner has to guess which box contains the oil. After each guess, the boxes are reshuffled, and the diviner makes another guess. The complete experiment consists of 10 such trials.

As Williamson states, if the boxes are sufficiently shuffled on each trial, the chances of the diviner's guessing the correct box just by luck are one in 10. In the complete experiment of 10 trials, we should expect, on the average, that a person who is just guessing should get about one right. The highest score made by the 50 different diviners who underwent this test was three correct. Although this is not a sufficiently high batting average for practical purposes, Williamson is willing to concede that the high man's performance was better than chance. Actually, the probability of a man's getting three or more correct in this experiment is about 8 in 100.

It is at this point that students of statistics, some engineers, and many laymen make a serious mistake. They fail to realize that if one gives a rare event sufficient opportunity to occur, it will eventually happen. In considering Williamson's experiment we must take into account the fact that he conducted it 50 times. If each diviner was just guessing, we would expect, on the average, that as many as four out of 50 diviners would get three or more correct. Indeed, we wouldn't be surprised

— on a chance basis — if one diviner guessed correctly four or more times. Because only one of the subjects had as many as three correct answers, the total performance of Williamson's diviners is not as good as we would expect it to be by chance.

More typical of laboratory experiments is the one reported by Foster (1923). This was similar to most laboratory experiments in that it was a test of only one diviner. This man, a pastor in a neighboring church, came to the psychology laboratory at the University of Minnesota and asked to be tested. He had built up a reputation over a period of 45 years by using his rod to locate water, oil, natural gas, iron, gold, and silver. He presented documents and testimonials from engineers and other witnesses who attested to his successes in Wisconsin, Minnesota, West Virginia, and Texas.

The psychologist subjected the diviner to a series of experiments, each of which was an attempt to test a specific claim of the diviner under controlled conditions. As in a number of other such laboratory experiments, the results were negative.

An Interesting Experiment

That is, the results were negative except for one test, and it is this test that we want to examine in further detail as a clue to what happens in the divining process. The pastor claimed that his rod could estimate the depth at which a box of metal objects was located. The box was placed at different levels on a ladder which was one floor below the pastor. The pastor's rod had little trouble in differentiating the step of the ladder on which the box was as long as the pastor knew which step it was on. When the experiment was run without the pastor's being informed, then the rod's performance went down to a chance level. Finally, the experimenter reran the test, this time providing an audience of six spectators. These spectators were placed on a landing so that they could simultaneously see the experimenter's placing of the box on the ladder and the pastor with his rod one floor above. Under these conditions, the pastor's performance was significantly better than chance.

Why did an audience improve the pastor's performance? The answer was easy. The spectators knew which step the box was on. When it was placed on a high step, they had to stoop somewhat to see it. When it was on a low step, they didn't have to stoop at all. The pastor was able to take advantage of these involuntary cues of the onlookers and thereby improve his score. The important point is that the pastor was not aware that he was reacting to such subtle cues. Indeed, throughout the experiment, whether his rod was responding correctly or not, he was sure it was reacting with infallible precision. When the experiment was over,

the pastor was absolutely astounded at the results.

The experiments we have presented form only a small portion of the case against water witching. We have felt justified in presenting only some of the data, selected to illustrate the various levels of evidence, around which the controversy rages. The reason we have emphasized representativeness rather than completeness is that both the proponents and opponents agree on the story to be derived from this mass of evidence. Believer and skeptic alike readily admit that the more closely the investigation approximates the conditions of a laboratory experiment, the worse the diviner performs. Case histories and field tests provide the major support for the reality of water witching. Almost without exception, the experiments that fit into our categories of field experiment and laboratory experiment yield negative results concerning the diviner's prowess. Up to this point, there is little discord.

The difference of opinion between skeptic and believer is in the interpretation of these facts. Each side draws a different moral from the same story. To the skeptic, the inability of the diviner to produce in the laboratory situation suggests that water witching has no basis in fact. It has failed to justify its existence according to scientific standards. To the believer, however, the unsatisfactory results are clearly due to the inadequacies of the scientific approach. The diviner produces "when it counts" — in his home environment, unhindered by the artificialities of scientific control. If science fails to see its value, then so much the worse for science.

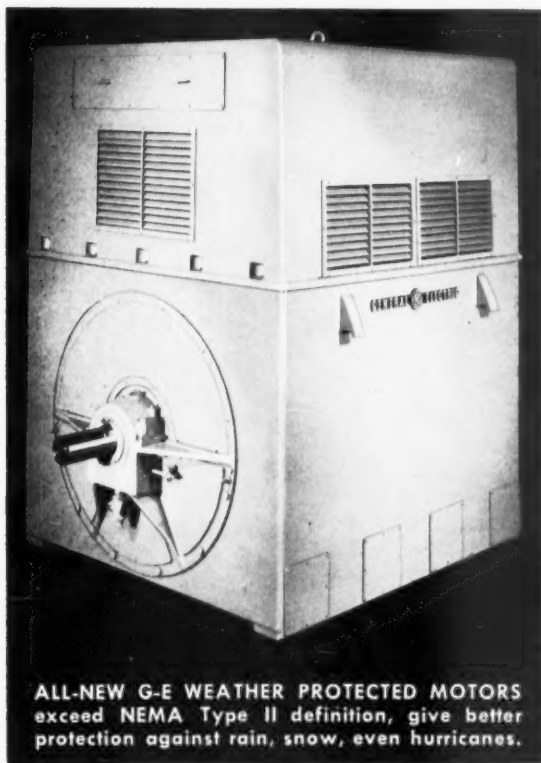
It is commonplace to say that the scientist dismisses water witching out of prejudice. While it is probably true that many scientists would be prejudiced against such a proposition as water witching, the argument we are presenting is not one based on prejudice. If we substituted some innocuous name such as "gluxting" for water witching, or substituted some other more plausible phenomenon, and then backed it up with the same amount and kind of evidence that now exists for witching, we have no doubt that the unanimous scientific verdict would be "not proven." In other words, we don't have to resort to prejudice to dismiss water witching as invalid. The evidence for it, when assembled and examined, is not merely insufficient, it is appallingly negative. We know of few other hypotheses that have been put forth so persistently over such a long span of years with such consistently negative experimental findings as the hypotheses that water witching "works."

What Makes the Rod Move?

Still, the rod does move. Not only does it move in the hands of the gifted diviner, but it turns with such force that the bark frequently comes off in his

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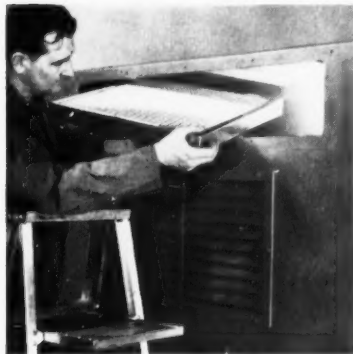
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hands. The subjective feeling, according to diviners' own accounts, is that the rod is being pulled by an external force against the restraining grip of the diviner. The diviner typically will assert that he was trying to prevent the rod from moving at the moment of its action.

The experience of having the rod turn in one's hands, seemingly of its own volition, has a powerful and often irreversible impact upon the rod-wielder. Such an experience has converted many skeptics into firm advocates of the position that some unknown force or agency moves the rod. Certainly, they maintain, the diviner does not move the rod. The conviction that he does not activate the rod is, in most cases, sufficient to make a person a firm believer in the efficacy of water witching. Rarely in the history of water witching has a diviner recuperated from this initial experience to the extent of making a more rational inquiry into the rod's antics.

Mechanics of Rod Movement

The precise mechanics of the movement depends upon the kind of divining instrument that is used — the pendulum, the straight rod, the forked twig. It also depends upon the kind of grip that is used. Because the forked twig, held in the standard palms-up grip, is the overwhelming preference of American diviners, we will detail only the mechanics of that method. If you grasp the forked twig in the standard grip — palms upward, rod pointing forward at an angle of 45 degrees, hands compressed together — you will cause the rod to move by any of four slight changes of grip. The movement occurs, in each case, when forces and stresses in the rod become greater than the force by which the diviner grips the rod. Typically the diviner holds the rod under considerable compression, i.e., he pushes the two forks toward one another to create the tautness in the rod. In this case, if he just eases his grip slightly, the rod will move. It moves because the tension in the rod is now greater than the force of the grip. A second way to move the rod is to rotate your wrists slightly toward each other. Even a slight, imperceptible rotation is sufficient to give quite a kick to the rod's rotation (if you rotate your wrists outward, the rod will tend to rotate upward). The remaining two ways to produce the rod's movements are to pull the hands slightly apart or to push them slightly together. Either of these movements creates greater tension in the rod than in the force of the grip. When the balance is so upset, the rod acts like a coiled spring and may straighten out with such force that the bark may literally come off in the diviner's hands.

Each of these movements, or a combination of them, are almost always made imperceptibly and unconsciously. The subjective impression is always

that the stick twists in opposition to your grasp. In a sense, this is true. The tighter your grasp, the less chance the rod will have to move. But, as is inevitable, a slight relaxation or strengthening of the force of your grip will send the rod flying against your grip. In every case, the movement is always the resultant of mechanical forces applied or removed by muscular action of the diviner.

The late Kenneth Roberts vigorously and frequently rejected explanations such as the foregoing mechanical analysis to account for the rod's movements. "What makes the rod work? We don't know. For 300 years, opinionated but ill-informed scientists have insisted that it works because of unconscious muscular action on the part of the dowser. That isn't so, and we have proved that it isn't" (Roberts, *Water Unlimited*, 1957, p.59). The major proof is provided by what happens when Henry Gross holds two forked twigs simultaneously over flowing water. The upper twig is tilted slightly backward, and the under one is tilted slightly forward. In this position, the upper rod rotates upward while the lower rod rotates downward — in directions opposite to each other. "If this is muscular action, his muscles are moving in opposite directions at the same time. This can't happen any more than a person can run forward and backward at the same time."

But it is the rods and not Henry's muscles that are moving in opposite directions. Whether the rod rotates forward or backward is a matter of balance (with some diviners it goes in either direction). From our previous mechanical analysis, we would expect Henry's rods to behave just as Roberts says they do merely from a change in the balance of forces between Henry's grip and the tension in the two rods. One merely has to turn his wrists slightly inward, while holding the two rods as does Henry, to cause them to rotate in opposite directions.

The diviner has no feedback from his arms to tell him that his muscles are initiating the action; he is *unaware* of any involvement on the part of his muscles until after the rod has begun to move, and he feels that his hands are trying to prevent the action.

Here, then, we have the explanation of water witching and how it works. This is not to say that there are no unknowns in the story. There are sufficient unsolved problems to challenge the physiologist and psychologist for many decades to come. But these problems are not peculiar to water witching. They are problems involving the more general questions of human behavior — problems such as how stimuli initiate sensory and motor behavior, the complicated and elusive problem of consciousness and awareness, and the dramatic manifestations of abnormal and emotional behavior. ▲▲

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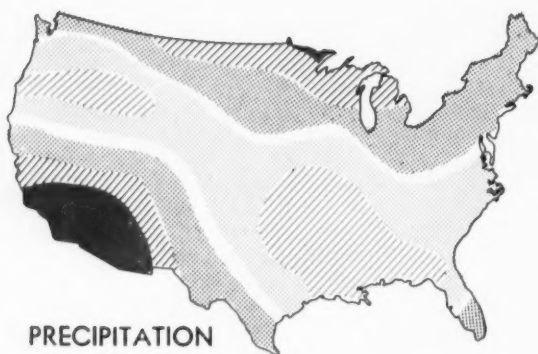
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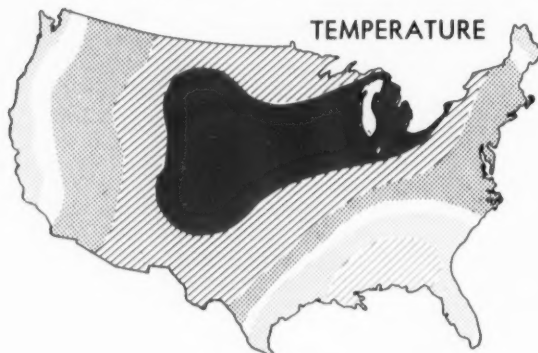
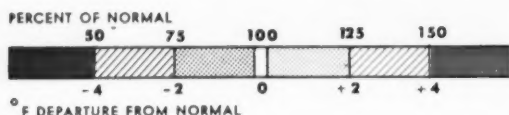
KRICK WEATHER OUTLOOK

MAY 1959

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PRECIPITATION



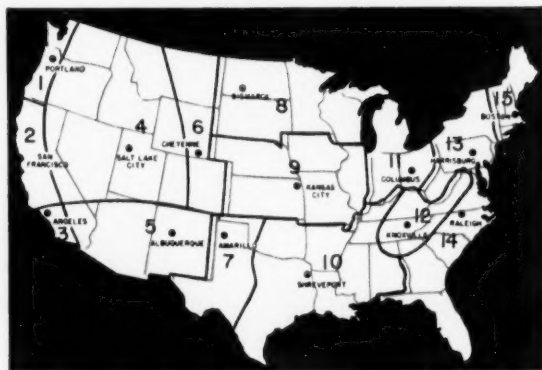
TEMPERATURE

MAY HIGHLIGHTS

During May, cooler than seasonal temperatures are in prospect over much of the United States. However, a slightly warmer than normal month is expected in the Gulf coastal sections, and near normal temperatures are likely in the extreme western regions. The coolest temperatures, compared to normal, are expected in the area through the central part of the country as indicated on the temperature anomaly map. These cool temperatures will come from repeated surges of cool Canadian air moving southeastward into the country. Look for predominantly drier than normal conditions in the southwestern quarter of the U.S. Since the normal moisture over much of this area ranges less than 0.2", many locations should have no rainfall. Also the area along the Canadian border, extending from the eastern Great Lakes region to the Rockies, is expected to be much drier than normal. Frequent storms are expected to develop off the Pacific Northwest coast, bringing much above normal moisture from the Oregon coast southeastward to the Absoraka Mountain Range in western Wyoming as they move inland. These stormy patterns should progress rapidly across the central portions of the country, where cool Canadian air associated with the systems should trigger frequent showers. Much above normal rainfall should prevail over the lower Mississippi River Basin. As a whole, look for favorable construction weather throughout the southwest and northeast. Southern, central, and northwestern regions should have fewer favorable construction days than normally expected for May.



TEAR OUT ALONG PERFORATION.



CONSTRUCTION DAY FORECAST LOCATIONS

CONSTRUCTION DAY CRITERIA

To be considered a construction day on these charts, the day's maximum temperature must be more than 38 degrees. There must be less than six inches of snow on the ground. There must be less than six hours of active precipitation during the period between the hours of 7 a.m. and 5 p.m. There also cannot have been more than one inch of rainfall on the preceding day.

CONSULTING ENGINEER

These forecasts are prepared by Irving P. Krick Associates, Inc., the world's oldest and largest weather engineering firm. The forecasts are based on methods developed by this group at California Institute of Technology prior to World War II. After the War, the methods were adapted to high speed electronic computing machines to shorten the time required to solve the complex problems of the atmosphere. Ultra-long range forecasts, up to a year or more in advance, are now available. Information on other Krick weather services is available by writing to the home office of the firm at 460 South Broadway, Denver, Colorado.

CONSTRUCTION DAYS

MAY 1959 ESTIMATES															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	31	31	31	31	31	31	31	31	30	30	31	31	30	31	30
LOWEST	22	29	28	28	30	19	28	25	26	25	25	27	23	28	23
AVERAGE	28	30	31	29	31	27	29	29	28	27	28	28	26	30	26
ESTIMATE	25	30	31	28	31	26	29	29	28	27	27	28	27	29	27

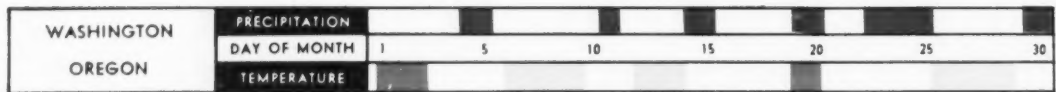
These estimated construction days for key cities in the United States should be interpreted as an average of estimated conditions over the forecast area. To obtain the best results, the forecast number of construction days should be compared with the temperature and precipitation anomaly maps and the timing estimates to determine the probable number of construction days in your locality. The forecast construction days are based on average construction day requirements as defined under "Construction Day Criteria," and should be adjusted for individual operations.

JUNE AVERAGE AND RANGE*															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
LOWEST	25	28	29	27	29	26	28	24	24	27	26	27	23	26	24
AVERAGE	28	29	30	29	30	28	29	27	27	29	28	28	26	28	27

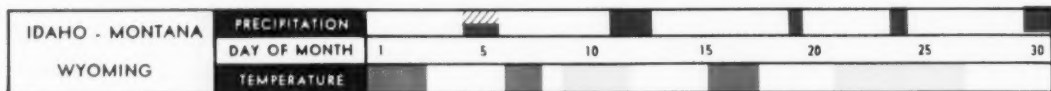
JULY AVERAGE AND RANGE*															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31
LOWEST	30	29	31	30	29	27	29	28	23	28	26	26	26	24	21
AVERAGE	30	31	31	30	31	29	30	30	28	30	29	28	29	28	28

*Historical Average, Not a Forecast

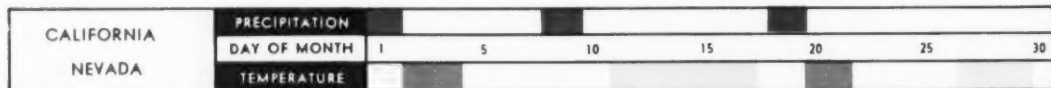
MAY 1959 TIMING OF SIG



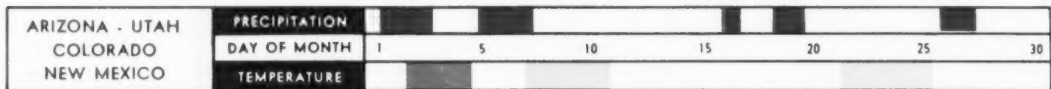
Temperatures throughout this two state area are expected to range from near normal to slightly below normal during the month of May. Look for precipitation totals to range from near normal over most of Washington to much above normal over most of Oregon.



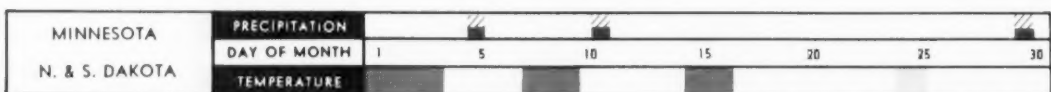
Quite cool temperatures are expected to open the month in the Rockies and eastern Plains. The stormy interval around the 5th and a fast moving stormy pattern following the 10th are expected to concentrate mainly in southern sections of the area.



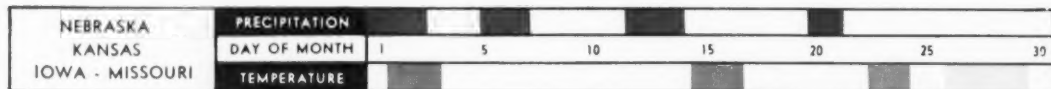
Rainfall during May is expected to be light, with the mountain areas likely to receive the heavier amounts during the indicated stormy periods. The cool period indicated for a day or two around the 3rd should effect mainly northern portions of both states.



Precipitation totals are expected to range from near to slightly above normal in the northeastern portions of Colorado to much below normal over Arizona. The stormy interval following the 5th will concentrate mainly in Utah and western Colorado.



Look for a cooler than normal month throughout this three state area. The cool weather indicated around the 8th on the timing bar is expected to affect mainly eastern sectors. Much less than normal precipitation is expected over the area.







Temperatures should be much below normal and the indicated periods of cool weather are expected to drop nighttime temperatures to near or below freezing in many sectors. Moisture totals are expected to range from near to slightly above normal.

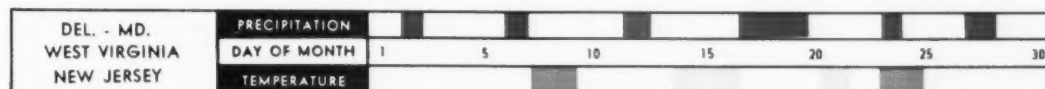


Cooler than normal average temperatures are expected throughout the Great Lakes region during May. Eastern areas are likely to receive the cooler temperatures as compared to normal. Precipitation totals are expected to range much below normal.

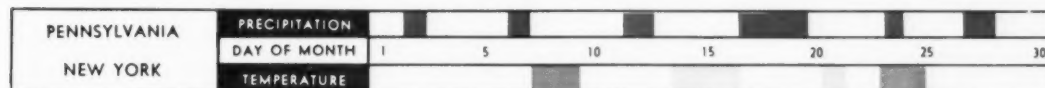
SIGNIFICANT WEATHER EVENTS

RAIN	
SNOW	
WARM	
COLD	

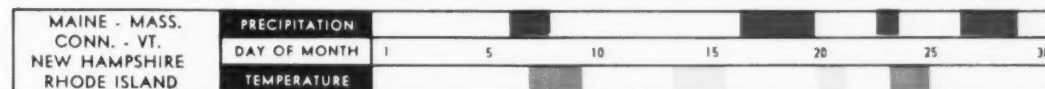
The timing bars below are intended to indicate periods of important general storminess and important departure from temperature normals in areas indicated. They are highly accurate over the area indicated, but are too general to pinpoint small local storminess or showers. Allow one day on either side of indicated storm or extreme temperature periods for general planning. Combination rain or snow shading indicates either one or both.



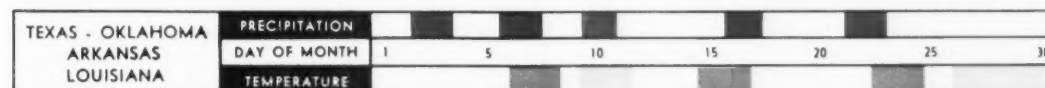
Temperatures ranging from near to slightly below normal can be anticipated throughout this area. Much of the month's moisture is expected to fall in the form of scattered showers. However, look for important general storminess over the area around the 18th.



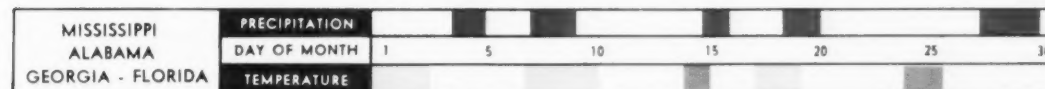
Slightly cooler and drier than normal is the outlook for this area during May. Much of the month's storminess is expected to fall in the form of intermittent showers, although the stormy period indicated around the 28th should bring important moisture.



Near to slightly below normal average temperatures are expected over this area during May. Look for precipitation totals to range slightly below normal. Nighttime temperatures during the indicated cool periods are not likely to be extremely cold.



Precipitation totals throughout this area are expected to range from slightly below normal in the southwest to much above normal in eastern portions. Panhandle areas are likely to receive the cooler temperatures as compared to normal during the month.



Near to slightly above normal average temperatures are expected throughout the lower south during May. It is anticipated that the rainfall amounts during the month will be heavier, as compared to normal, in northern and western sections of the area.



Temperatures throughout this area are expected to range from near to slightly below normal during May. Look for rainfall amounts to follow a similar pattern, with southern sections likely to receive heavier amounts, compared to normal, than the rest of the area.

BRUNER Industrial WATER SOFTENERS

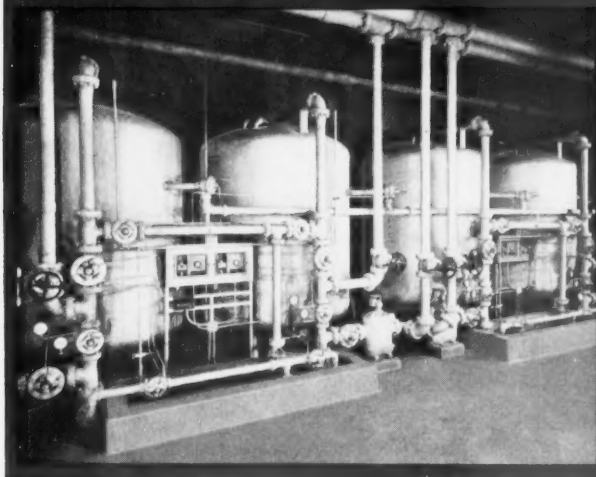
... are frequently
SPECIFIED

by leading engineers
for important installations



This is Mayfair, Milwaukee, one of the largest shopping centers in America. One of Bruner's largest water softener installations softens all the water—even in the air conditioning system.

Hundreds of Bruner commercial and industrial installations throughout the United States and in many foreign countries are providing trouble-free service in both large and small applications. Water softeners, filters, and other Bruner water conditioning equipment are available for immediate delivery from stock in many types and sizes. Custom installations are fabricated to engineer's exact specifications.



The Bruner softeners at Mayfair are fully automatic. Salt storage and brining systems are specially designed. Softener capacity is 13,000,000 grains and delivers 1,750,000 gallons of softened water @ 1200 GPM.

Consulting Engineer: L. R. SCHMAUS CO., INC., Milwaukee, Wis.

Architect: GRASSOLD-JOHNSON & ASSOCIATES, Milwaukee, Wis.

Plumbing Contractor:
SEDLER PLUMBING &
HEATING, INC.,
Milwaukee, Wis.



Automatic Industrial type softener carried in stock.

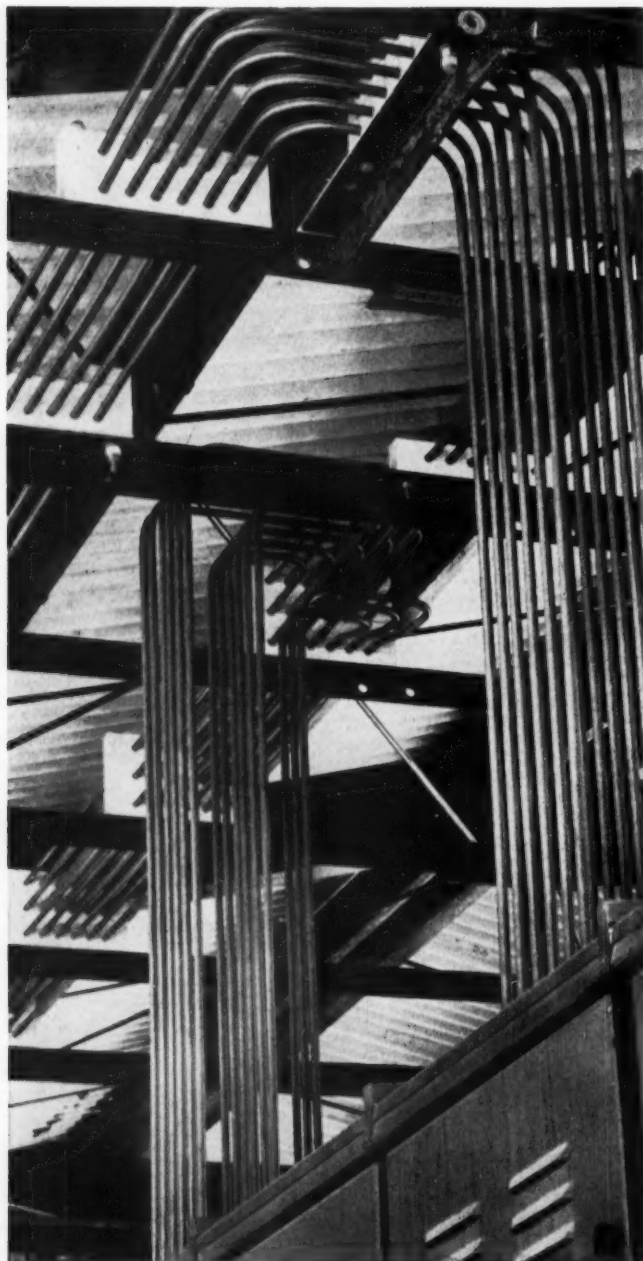


BRUNER CORPORATION

America's most complete line of quality water softeners and filters.
Executive Offices: 4763 N. 32nd ST., MILWAUKEE 9, WIS.
Telephone: HILLtop 2-3200

Plants: Milwaukee, Wis., and Los Angeles, Calif.
Sales and Engineering Offices in all principal cities.

what you should know about TYPE



CHARACTERISTICS OF TYPE MI

1. Just what is MI? Here's how the NEC describes MI (Article 330): "A cable in which one or more electrical conductors are insulated with a highly compressed refractory mineral insulation and enclosed in a liquid-tight and gas-tight metallic tube sheathing." The conductors and the sheath are electrolytic copper. The mineral insulation is magnesium oxide. MI IS UL APPROVED.

2. What's so unusual about it? Since it is of all-mineral construction—copper and inert magnesium oxide—it is not subject to normal destructive influences such as heat, moisture, sunlight, oils, etc.

3. Is it flame-proof? Absolutely. Magnesium oxide is non-flammable and will not support combustion.

4. What are its temperature limits? MI may be operated continuously with ceramic terminating seals at temperatures as high as 250°C (482°F). For a "one-shot" application it may be operated at temperatures as high as the melting point of copper (1083°C). Routine Code applications which use standard terminating seals should be kept at 85°C (185°F) in the termination area.

5. Is it moisture-proof? Yes. The seamless copper sheath is impermeable to moisture. Properly applied end seals completely seal against moisture.

6. Why is it electrically safer? A grounded wiring system is safer than an ungrounded one. It is impossible to install MI properly without effectively grounding it.

7. What is the current rating of MI? For general use, the rating is determined by the standard end seals, which are rated at 85°C (185°F).

8. What is the working voltage of the system? The maximum working voltage is 600 volts AC or DC. Factory test voltage is 2500 volts.

MI CABLE

FOR 600-VOLT APPLICATIONS

9. What's the normal life of an MI wiring installation? MI will outlast the structure in which it is installed.

WHERE MI IS USED

10. Can MI be installed in industrial plants? It is ideal for industrial installation, because it eliminates downtime and repair work due to cable failures. MI IS UL APPROVED FOR HAZARDOUS LOCATIONS.

11. Is it useful in any type of industry? It certainly is, particularly because of its resistance to heat, moisture, oils, chemicals and other harmful influences. Successful installations have been made in pulp mills, glass factories, printing plants, chemical plants, petroleum refineries, ships, coal mines, dairies, breweries, steel mills, and many others.

12. Where else is MI used? Because of its small space requirements (no conduit or duct is required), safety and neat appearance, it has been used in schools, museums, commercial buildings, hospitals, research laboratories, and in machine tool wiring.

HOW MI IS INSTALLED

13. Is it difficult to install? No, it is very easy to install. All you have to do is cut it to length, train into position and secure it by standard clamps or straps to any surface. No conduit or duct is needed. It is easy to terminate and attach to standard boxes or equipment.

14. Can it be used with other wiring systems? Yes: MI is perfectly compatible with other wiring systems.

15. Are special boxes or equipment attachments required with MI? No. You can attach it to all standard electrical boxes, enclosures and equipment. Threaded MI cable fittings in the four standard

conduit group sizes and having standard conduit threads may be ordered with the cable.

16. Do you need special tools? Only two: a sheath stripper and an end seal crimping tool. Both are available from General Cable. Except for these, regular electricians' tools are all that are needed.

17. Does MI bend easily? You can bend it by hand in the smaller diameters. In larger sizes, a standard bending tool or "hickey" will do the job easily.

18. Is special training needed to install it? No. A qualified electrician can do it simply by referring to the instructions in the Instruction Manual included with each shipment.

19. Where can fittings be obtained? Fittings may be ordered with the cable in the quantity desired. They'll be delivered with the cable.

20. How about delivery? Most sizes are available from stock. The local General Cable office nearest you can give you full details.

Ask any General Cable Authorized Distributor or your General Cable Representative—at any one of the 65 General Cable offices coast-to-coast—to pinpoint actual installations of Type MI in plants comparable to your own. For a free copy of the new 12-page Type MI Catalog, just write Dept. CE-5.

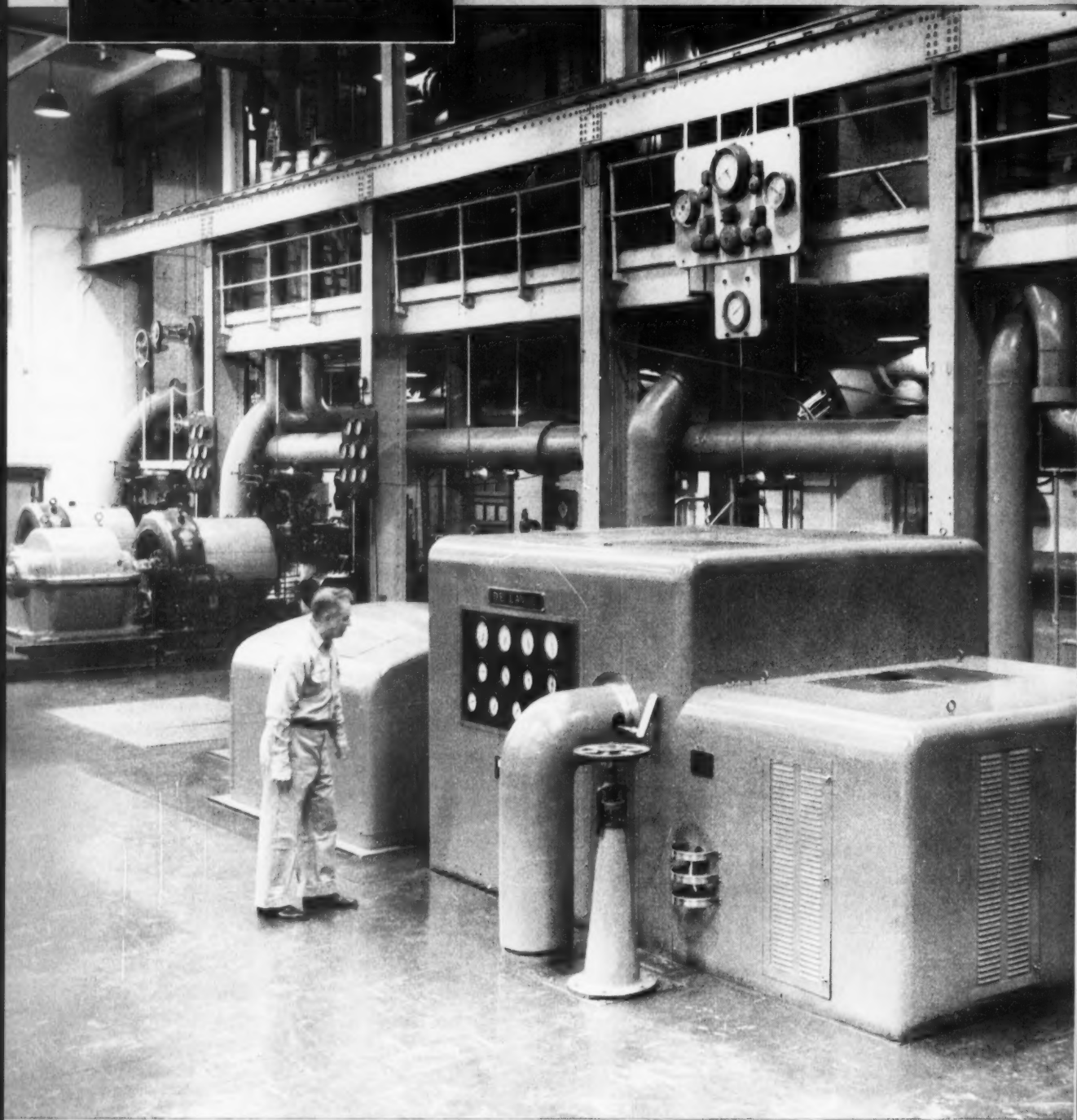
GENERAL CABLE CORPORATION,
420 Lexington Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast



for quality and service...specify GENERAL CABLE

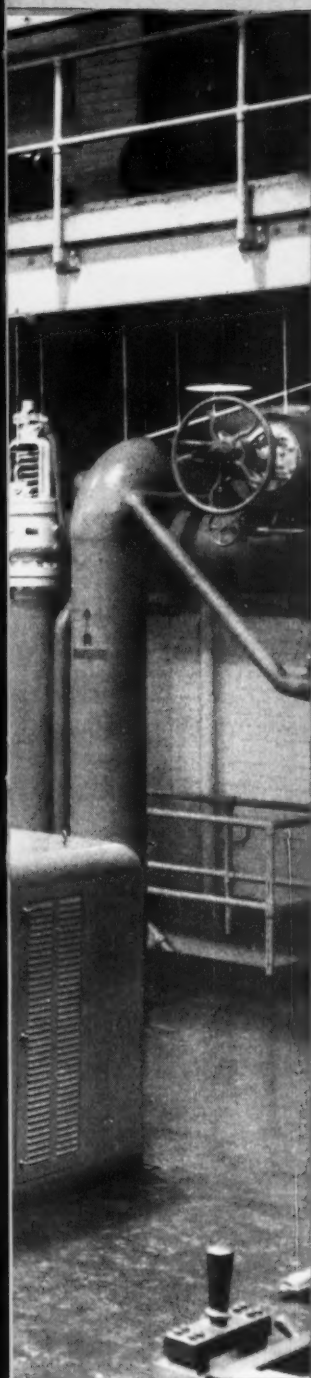
DE LAVAL STEAM TURBINES

for process industries



The photograph above shows a De Laval direct-connected turbine generator installation at Parke, Davis & Co., Detroit, Michigan.

This controlled extraction, controlled back-pressure unit supplies 2000 kw using process steam. Extraction is at 130 psig, exhaust is 5 psig. This new machine was added to already existing De Laval units that have been in service for 30 years. In addition, the Parke-Davis Research Laboratories in Ann Arbor, Michigan will soon be using a new 1000 kw unit.



Parke, Davis & Co. uses **DE LAVAL Steam Turbines** for process and power generation

Proved economy, dependable service

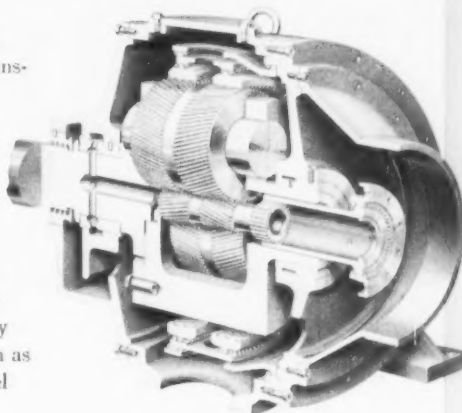
In many process industries, an important by-product is economical electric power. If appreciable quantities of process steam are used, power generation can be achieved at comparatively low cost.

De Laval, pioneer in high speed rotating machinery, has continued to maintain engineering and manufacturing leadership. If you have process application where low-cost power generation can be utilized, call on De Laval.

De Laval-Stoeckicht Planetary Gears

In many applications where high speed and high horsepower are transmitted, the De Laval-Stoeckicht planetary gear can be used to great advantage. It is also used as a speed increaser or decreaser in many industrial installations.

Among its outstanding characteristics are light weight, in-line construction and space saving. It may be used for all kinds of drives such as gas turbines, steam turbines, diesel engines, etc.



Write for Bulletin 2400



DE LAVAL *Steam Turbine Company*

894 NOTTINGHAM WAY, TRENTON 2, N. J.

REPUBLIC HIGH STRENGTH REINFORCING BARS

**Reduce column size, save floor space,
permit design stress of 30,000 PSI**

**REPUBLIC HIGH STRENGTH
REINFORCING BARS MEET
ASTM SPECIFICATION
A-431-58T**

... "High Strength Billet Steel Bars for Concrete Reinforcement". Material used in bar fabrication is of a special high strength grade intended for use in concrete structures designed to require steel reinforcement with a yield point of 75,000 pounds per square inch.

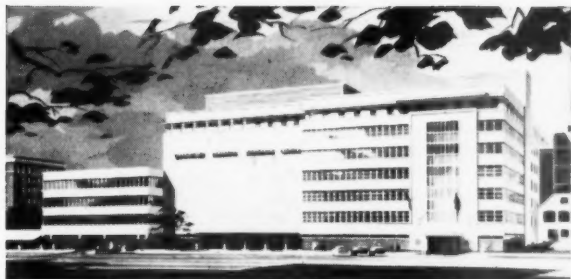
These advantages were obtained by employing large size, Nos. 14S and 18S Republic High Strength Concrete Reinforcing Bars for column verticals in the Washington National Insurance Company Building, Evanston, Illinois.

The building has unusually large bays, approximately 27' by 27' with flat slab reinforced floors 9" and 10" thick. While the building is only seven stories, and the floor live load 100 # per square foot, heavy loads must be supported by the columns because of the large bays.

Decision by the Architects-Engineers, Graham, Anderson, Probst & White, to use high strength reinforcing bars was based on utility rather than on initial economy.

For example, a first story column with conventional steel verticals consisting of two concentric spirals contain-





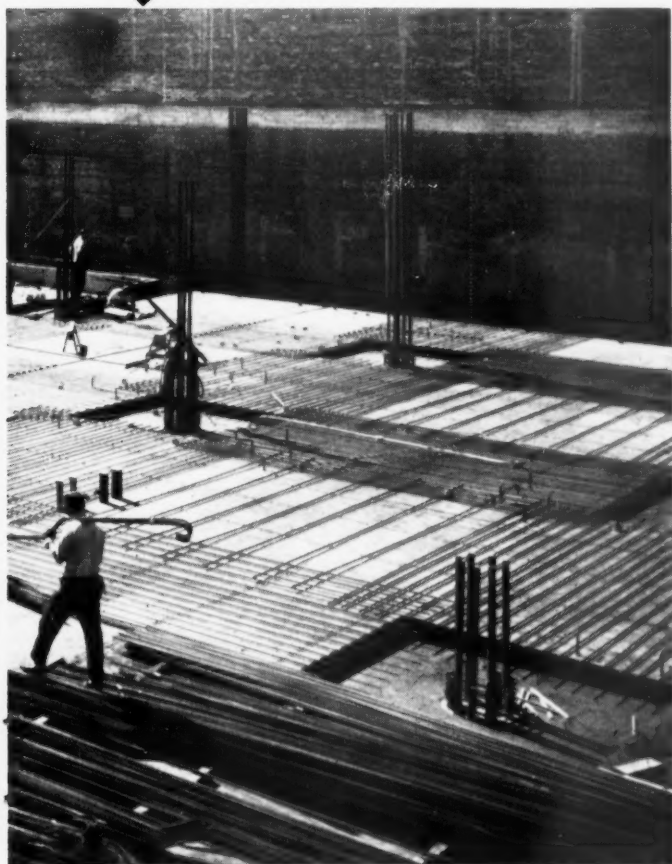
Washington National Insurance Company Building, Evanston, Illinois. Graham, Anderson, Probst & White, Architects-Engineers, Chicago. Norman F. Brunkow, Chief Structural Engineer. A. L. Jackson Company, General Contractor, Chicago. Gateway Erectors, Inc., Steel Erectors, Chicago.

ing 22 No. 11 bars, limited to a design stress of 20,000 PSI, would have been 32" in diameter. The same column using 11 No. 18S butt-welded, high strength bars, with a possible design stress of 30,000 PSI, measures 26" in diameter—a saving in floor space of approximately 2 sq. ft. per column.

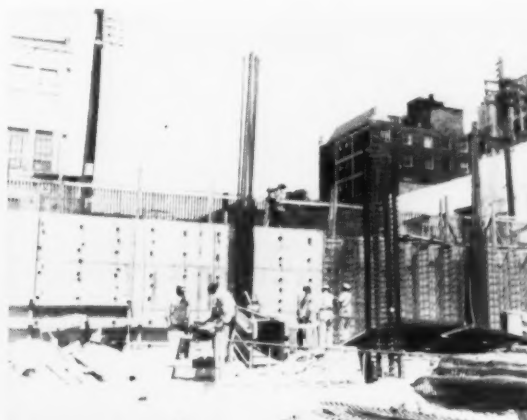
Republic High Strength Reinforcing Bars provide a minimum yield point of 75,000 pounds per square inch and meet the new ASTM Specification A-431-58T.

The high strength bars are rolled from new billet steel only, in all standard sizes including, 14S (1½" square equivalent) and 18S (2" square equivalent). Bars can be specified to any length up to 60 feet. All splices are field welded. Mail the coupon today for full facts.

Progress photo below shows the setting of reinforcing steel in the second floor and indicates the staggered heights of column verticals.



NO. 18S HIGH STRENGTH REINFORCING BARS used in column verticals are electrically butt-welded in basement story adjacent to steel sheet piling. To accomplish the weld, the lower bar is furnished with a square cut end and the top bar is beveled at 45 degrees from each side to form a chisel end. Clamps are used to hold bars in alignment.



This photo shows first and second story column verticals extending above the basement floor after having been butt-welded to the dowels in caisson tops. Bars are No. 18S high strength types furnished by Republic Steel.

REPUBLIC STEEL

*World's Widest Range of Standard Steels
and Steel Products*



REPUBLIC STEEL CORPORATION

DEPT. CI-7394

1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on Republic High Strength Concrete Reinforcing Bars.

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Company _____

Address _____

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Field Notes

MARJORIE ODEN, Eastern Editor

Trouble at Salt Lake

FOR THE PAST FEW YEARS the Consulting Engineers Council has had an active and perfectly proper program aimed against the offering of "free engineering" services by manufacturers. Wherever there has been evidence of this going on, the Council, and frequently officers of some of the member Associations, have written to the offending manufacturers calling attention to the Council's stand against this type of activity. The Council believes that manufacturers should stick to product engineering and manufacturing products at the best price and the highest quality possible. They want the design engineering left to consulting engineers.



Sometimes this gets a little out of hand. There is, for instance, the time the Council got out letters condemning manufacturers for bidding on the design of an air conditioning project and at the same time congratulating other manufacturers for not bidding on the engineering work. The only silly aspect about this was that the manufacturers who got the resolutions of praise would have had a hard time bidding if they had wanted to, for the system specified and briefly sketched was practically proprietary. The poor manufacturers were unhappy about being eliminated from bidding by what amounted to closed specifications, yet they got a song of praise from the Council for being so ethical in refusing to bid.

Perhaps there are some small compensations for not being able to get in on a job after all.

Agents as Engineers

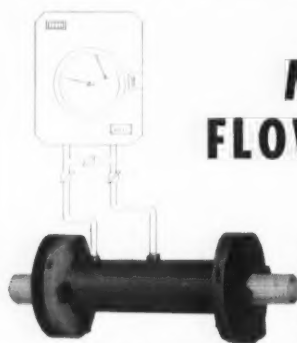
A much more serious situation recently developed in Salt Lake City, and it calls attention to the need for better investigation and better communications within the Council and its Associations, if henceforth they want to avoid the disasters of leaping before looking.

The background is this:

Salt Lake City is notorious for the amount of design work done for architects by manufacturers and manufacturers' agents. This type of thing is certainly known in many other parts of the country, but Salt Lake City is an outstanding example. The consulting engineers in the area have been complaining for some time that they faced a serious situation, not only in competition from "free engineering" by manufacturers but also from manufacturers who actually charged fees for their work and competed directly with the engineers in private practice. Until a few months ago there had been plenty of talk among consultants but little action.

Then, a consulting engineer from Washington State got a project in Salt Lake City. In his work

Introducing the new **MASS FLOWMETER** FOR GASES



Patent Applied For

Element is an orifice whose area is varied by a T/P sensitive filled bellows. The design of the primary element offers these features:

1. Automatic, no auxiliary power is required, it can be installed in isolated locations.
2. Easy installation in line with no offset, as easy to install as a valve.
3. Rugged and trouble free, there are no rotating parts.
4. Complete metering and controlling systems available. Or primary element can be obtained separately for use with any commercial metering and controlling equipment.

Specify the NIL system or element wherever gas flow is to be metered or controlled.

Write for Bulletin 178

NATIONAL INSTRUMENT LABORATORIES, INC.

838 Evans St., N.E.

• Washington, D.C.

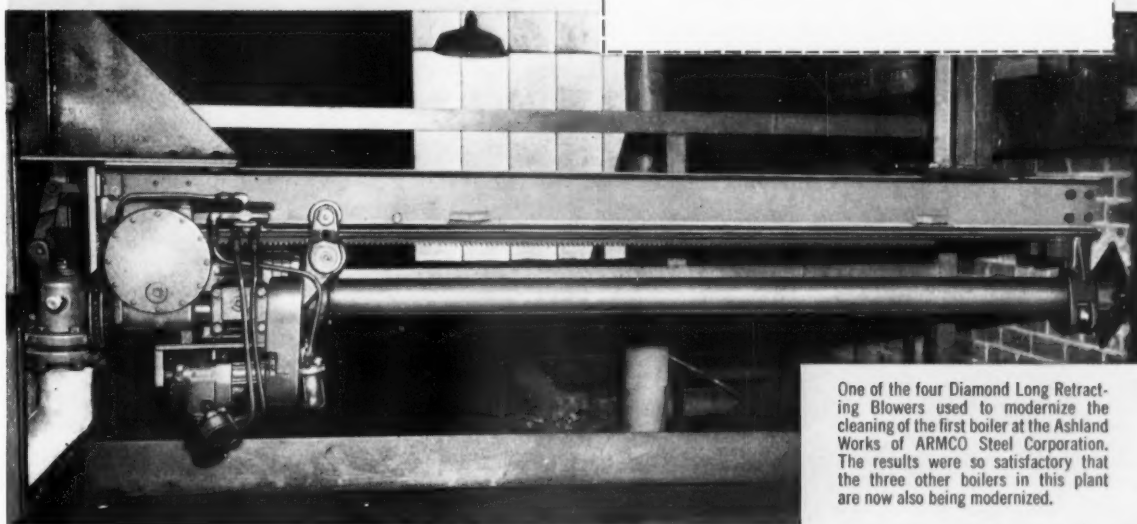
Phone NOorth 7-7582

AT ASHLAND, KY. WORKS OF
ARMCO STEEL CORPORATION

11%
More Steam
100°F
Lower Exit
Gas Temperature

**RESULT FROM BOILER CLEANING
MODERNIZATION PROGRAM**

Using
DIAMOND
LONG RETRACTING
BLOWERS



One of the four Diamond Long Retracting Blowers used to modernize the cleaning of the first boiler at the Ashland Works of ARMCO Steel Corporation. The results were so satisfactory that the three other boilers in this plant are now also being modernized.

"Increased boiler capacity can often be obtained by modernizing boiler cleaning equipment. Another benefit of such modernization is more efficient utilization of the fuel . . . getting more heat into the steam for useful work and wasting less heat up the stack.

For example, at the Ashland, Kentucky Works of the ARMCO Steel Corporation there are four boilers that were unable to supply the growing steam requirements of the plant. The high exit gas temperatures suggested that a study be made to determine whether the cleaning could be improved to provide additional capacity. This study indicated that more steam from the same fuel could be expected if high pressure long retractable blowers were used for cleaning instead of the rotary blowers with which the boilers were originally equipped.

The expected results seemed sufficiently promising and it was decided to modernize the cleaning equipment of one boiler. The seven rotary blowers were replaced with four Diamond Long Retracting Blowers, one of which is shown below. This modernization proved to be justified as the

boiler's maximum steam output was increased 11% and the exit gas temperature was reduced approximately 100° F.

A "Boiler Cleaning Modernization Program" is well worth careful consideration because it can mean substantial savings in so many ways. In addition to increased capacity and more efficient fuel utilization, there is reduced maintenance . . . also reduced operating costs when motorized units and automatic operation are installed. Even though your boiler cleaning was the best at the time it was installed, improvements since then will probably pay off. For many years Diamond has been doing continuous research to improve boiler cleaning and boiler cleaning equipment.

Ask the nearest Diamond office (or write directly to Lancaster) to make a study of your boiler cleaning . . . the possible savings may surprise you."

8293

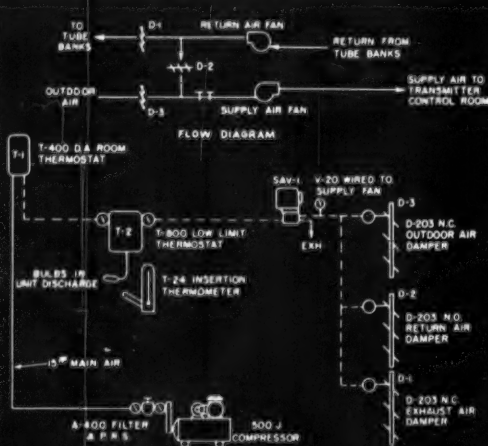


The Mark of
BETTER BOILER CLEANING
AT LOWER COST

DIAMOND POWER SPECIALTY CORPORATION • LANCASTER, OHIO

DIAMOND SPECIALTY LIMITED • WINDSOR, ONTARIO

JOHNSON PNEUMATIC CONTROL



Johnson Pneumatic Temperature Control System for ventilating unit in a television transmitter equipment room.

Gives Sure Protection on Your Important Smaller Jobs

The importance of an air-conditioning, heating or ventilating system has little to do with its size. The small installation illustrated above, for example, protects sensitive television transmission equipment. Since dependable, trouble-free operation is essential, a *pneumatic* control system was specified and installed by Johnson.

Whenever you have a job where quality and dependability of control are the key considerations, it is to your advantage to specify a pneumatic system by Johnson.

Johnson lets you center responsibility for all control work — from design through installation — in one specialized organization. Each system, regardless of size, is planned and installed to meet the exact requirements of the individual job. As a result, you get a control system that is comparable in efficiency and quality to those Johnson does for the best of the larger installations.

Complete engineering, sales, installation and service facilities are available from over 105 direct branch offices. Johnson Service Company, Milwaukee 1, Wisconsin.

JOHNSON CONTROL
PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

on the project, he was requested by the contractor to permit the substitution of a different manufacturer for some of the equipment. In looking into the reason for the request for substitution, it turned out that the contractor was a sales representative for the brand he wanted to substitute. This surprised the consulting engineer somewhat, but after all, this is not unknown even outside of Salt Lake City. The consulting engineer refused to permit the substitution of equipment, but, later, in dealing with the manufacturer's representative for the originally specified equipment, he received a letter on which it was shown that this agent was himself not only a sales representative but also a "consulting engineer."

By this time, the Washington consulting engineer was thoroughly disturbed. Here was a contractor acting as a manufacturer's sales representative and a manufacturer's sales representative acting as a consulting engineer. The situation looked as though it deserved some investigation, so this consulting engineer from Washington (a member of the Consulting Engineers Association of Washington) got together with the Intermountain Institute of Consulting Engineers and learned that these were not at all unusual practices in Utah.

The Council Approach

Then, the problem was turned over to the Consulting Engineers Council, and word was passed to the affiliated associations. This is where the situation got out of hand. A list of offending manufacturers was passed around, and letters went out to them from all sides. Some of them were tactful and merely suggested that much could be gained by getting together and discussing the problem. They pointed out that cleaner, clearer relations would be established if contractors were contractors, sales agents were sales agents, and consulting engineers were consulting engineers. Unfortunately, some of the letters resembled frontal attacks and sounded rather threatening.

The method used did get results. According to Arnold W. Coon, president of the Intermountain Institute of Consulting Engineers, nine of the fourteen companies offering agent-design services (this term has to be used instead of "free engineering," for the agents were charging full fees for their engineering services) have announced their intention of "ceasing and desisting" from this practice.

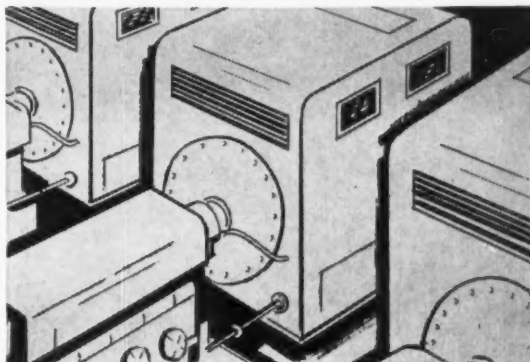
Typical of the replies was one from E. J. Grady, Vice President of Pacific Steel Boilers:

"Effective January 1, 1960, our representatives in Utah and Idaho will no longer accept engineering work to be performed in their offices. They will become a sales representative only. I am sure you can understand that a change of this kind cannot

Here's why you save by specifying Silicone Insulated Drive Motors

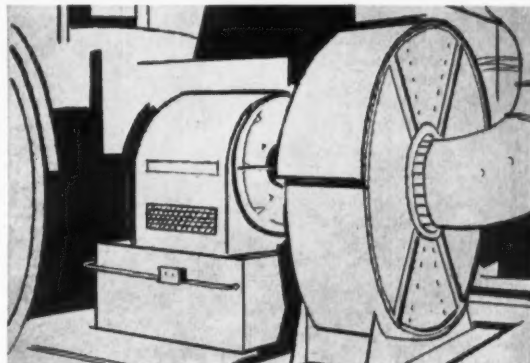
They're More Reliable

Utility engineers report that auxiliary drive motors carry 30% to 50% overloads without strain when they're designed to use the extra thermal stability of Dow Corning Silicones to increase service factor. That's greater assurance of service continuity than possible with any other insulation! This same thermal stability means top reliability in high ambient areas. Silicone insulated motors keep going despite overloads and ambients that cause other motors to fail.



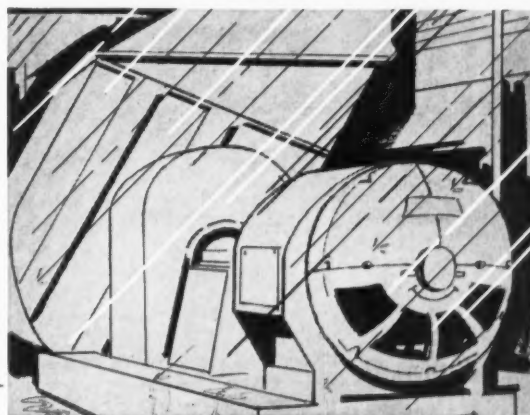
Smaller Motors Do The Job

By specifying motors with horsepower ratings matched to normal loads and letting the increased service factors provided by silicones carry the overloads, many companies now pay less for auxiliary drive motors. Following this practice, savings are realized not only in initial equipment costs . . . but in operating costs as well. Part-load inefficiencies and poor power factor resulting from overmotoring are eliminated. And, because silicone insulated motors pack more horsepower per frame size, mountings are smaller, less costly . . . installation problems minimized.



Simplified Enclosures Cost Less

Silicone insulated motors cost substantially less than other motors built for outdoor service. The reason: much lower enclosure costs because of "self-protecting" insulation systems made with Silastic, the Dow Corning silicone rubber. Specify open frames! There's no need for a premium priced enclosure to protect the insulation. Silicone rubber insulated open motors withstand torrential rains, hurricane winds, corrosive fumes, dust, snow, sleet, cold, heat . . . even flooding.



Send today for free brochure detailing how you can save with silicone insulated motors. Includes up-to-date list of manufacturers offering equipment insulated with Dow Corning Silicones.

Address Dept. 1017.



Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.



Electronic speed test in Propellair's wind tunnel

FOR RUGGED DUTY... NEW design axial fans in sizes up to 60 inches!

Move corrosive or explosive fumes, extreme heat or high humidity with new PROPELLAIR Type BT belt driven axial fans. They feature heavy 10 and 12-gage drums . . . isolated, air-cooled, protected bearings and belts . . . airfoil propellers cast of hi-strength aluminum-magnesium alloy . . . Robbins & Myers "All-Weather" motors for a single nameplate guarantee on the complete unit.

Hi-pressure, big hub propellers are available for those tough applications developing high resistance.

Send today for complete information on this modern, efficient fan. Ask for Bulletin 620—CE

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EXTENDED
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BELT
DRIVEN



MAN
COOLERS

MOVING AIR IS OUR BUSINESS®

be made overnight. Our local representatives have many commitments for the balance of 1959 which they must honor.

"We are always anxious to work with consulting engineers. If there is any way in which we may be of assistance to you, please let us know. We would be very happy to help you."

Similar letters were received from:

- † The American Air Filter Company
- † Fitzgibbons Boiler Company, Inc.
- † McDonnell and Miller, Inc.
- † Nash Engineering Company
- † Chicago Pump Division of Food Machinery and Chemical Corp.
- † The Patterson-Kelly Co., Inc.
- † The New York Blower Company
- † The Modine Manufacturing Company
- † Tuttle & Bailey Division of Allied Thermal

Slaughter of the Innocent

This may sound quite good from the consulting engineer's point of view, but there is more to it than that. Some innocents got hurt. One example is Western Blower Company, Inc. J. Ebbe Jensen, of that company, received a letter from the Intermountain Institute criticizing his firm for its "back-woods" policy of permitting the "agent-designer" type of representation in Salt Lake City." The letter was a fairly tough one, and Mr. Jensen was more than surprised; he was astounded. During January, February, and March he received other letters of the same type, from all over the country. Obviously, his company's name had been bandied about rather loosely, and the nature of the correspondence clearly indicated that as a manufacturer guilty of competing with consulting engineers on design work, he was going to have a hard time getting his products specified by consulting engineers not only in Salt Lake City but anywhere else in the United States.

This was particularly upsetting to Mr. Jensen because he pleaded not guilty. He does not have any agent in Salt Lake City. Mr. Jensen answered all the critical letters and even went so far as to sign an affidavit which says "I make this affidavit in answer to the unjust accusations that the Western Blower Company, Inc. is in competition with consulting engineering firms; affiant further states that the Western Blower Company, Inc. has done no professional engineering services during the entire last 24 years."

Guilt by Association

Here is a genuine example of guilt by association and condemnation without investigation. It will be interesting to see whether the Council and its members who wrote so quickly to Mr. Jensen will be



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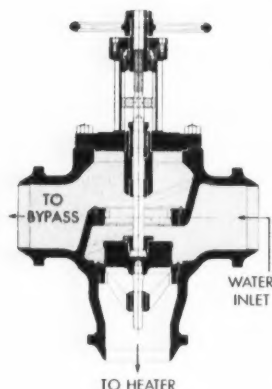
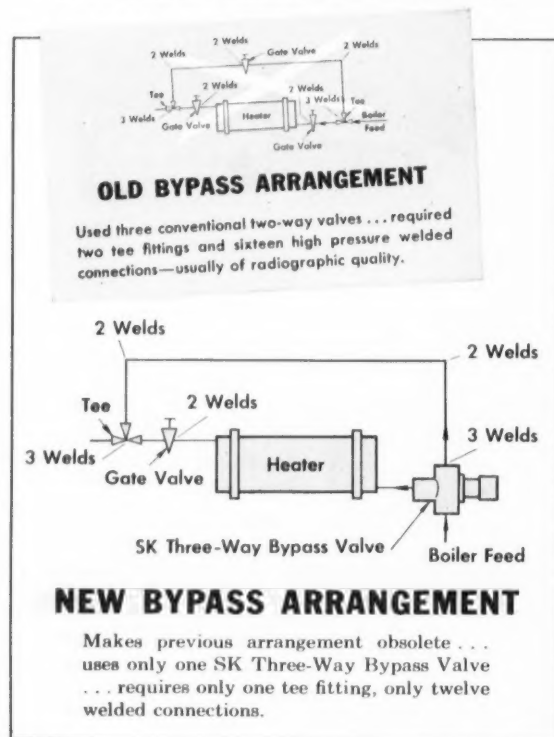
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as quick to apologize and acknowledge the harm they have done his company.

The Manufacturers' Answer

And then what about the "guilty" manufacturers, those whose agents were competing with engineers in private practice.

How do they feel about this?

We talked with several of the manufacturers who had received the "cease and desist" letters, and here is the way they look at it:

"We, as manufacturers, do not want to do engineering work. Particularly we do not want to do 'free engineering' because we know it is not 'free.' We lose money on it. We do not like for our agents or representatives to do engineering design even for a fee, for we know that this steps on the toes of consulting engineers, and they are about our best customers. We also have no objection to the Council, its Associations, and individual engineers opposing competition from manufacturers. That is their right, and they certainly have to look out for themselves in this type of thing.

Objection to the Method

"But we do object to the way in which the engineers went about this in Salt Lake City.

"For many years in that area it had been common practice for manufacturers' agents to do design work for architects for a fee. This was nothing new. The architects seemed to be satisfied, and there had been no great complaint from the engineers. In fact, our agents are registered engineers and have a right to offer these services under the law. Many of them are expert specialists in their fields. In our opinion, they were the best to be had in that area. After all, the fact that a man is in private practice does not automatically make him technically competent. It is true that there is much advantage to the client in having independent engineering counsel, but at least our agents were thoroughly competent men technically, and the architect clients felt that they themselves were in a position to judge, as independent professional men, the equipment and the products involved. In other words, the architects were specifying the equipment and then employing the agents on a fee basis to do the engineering. This is not the ideal situation, but it was one we felt was brought about because of the excellence of our agents as engineers and designers and the relatively few independent consultants practicing in that area.

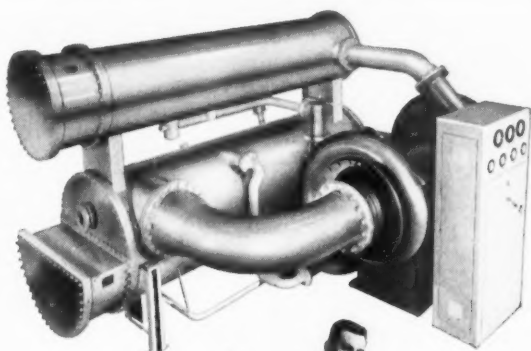
"Then, suddenly, we started getting letters from consulting engineers all over the country warning us that we must get out of the agent-design business. Obviously, some sort of a 'black list' had been distributed, and in some instances, the names on it

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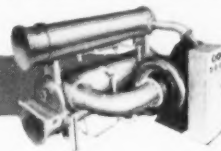
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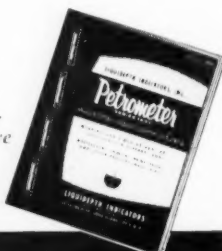


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did not deserve to be there and in others, the manufacturers were not so guilty as they looked.

"We responded to these letters by agreeing to halt all engineering design work by our men. But this, too, brings up some problems. It means that the architects who were dealing with us for design must now go to consulting engineers for the work. They are not doing this willingly. They are being forced to do it, and in many instances they resent being forced to deal with engineers. Right or wrong, they feel that they will not get as good engineering work as they did in the past.

Through Joint Committee

"As we said, we are glad to be out of engineering services, but we do not like the way the problem was approached. Why could not the Council and the Intermountain Institute have taken this up individually and quietly with each manufacturer? The Consulting Engineers Council has a joint committee with the Producers' Council; why could not this have been discussed in committee before manufacturers' names were put on a list and distributed widely to consulting engineers in all parts of the country, giving the manufacturers no chance to defend their position before they were condemned?

"We recognize that the Council is young and not experienced in handling matters of this kind, and they did not know the full story and did not intend to hurt us undeservedly, but we do wish they would investigate more thoroughly and deal directly before they start publishing names of 'guilty' parties.

AIA—Producers Council Example

"The CEC might benefit through observing how some of the older organizations have solved their problems. (Not by a head-on approach. This creates more problems than it solves.)

"Take the Producers' Council, for instance. This group was formed 50 years ago at the suggestion of the American Institute of Architects, when the architects had problems similar to the ones of the consulting engineers today.

"The Producers' Council, made up of companies that manufacture building products, equipment, and material, is particular about its membership. When we get a complaint that a member is producing shoddy merchandise or not living up to his sales catalog, we investigate immediately and thoroughly.

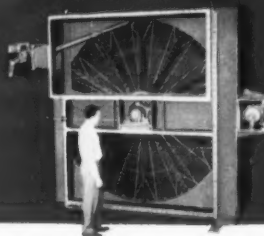
"If we find the accusations justified, out the member goes.

"But frequently we find the initial accusations were not the whole story. Maybe the complaint was based on a misapplication of the product. In any event, we hear both sides of the story before

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coming to a decision. We take no action without knowing the facts.

"The consulting engineers might find manufacturers willing and often eager to discontinue all engineering activity if approached with a hand-shake instead of a club.

"We want to cooperate, and we have cooperated most willingly in this Salt Lake City caper, but we would feel much more confidence in the Council if it would look carefully before it condemns."

Architects Object

The architects also had a word to say. Six architects in Salt Lake City sent out this letter explaining how they felt:

To Whom It May Concern:

The number and types of material and equipment that are required for a modern structure are countless, and they are being added to as newly conceived or designed products are being made available. Frequently the person best acquainted with products which compete for acceptance as equal or superior is the person who is educated and trained as an engineer and who has, beyond this, devoted many years in the design of systems in the narrow field in which he specializes. By a long process of economic selection these same engineers

have come to represent some of the leading lines of competitive equipment produced by long-established and responsible concerns.

It is our practice to make use of these engineers as consultants, and we shall not permit their reports or recommendations to be substituted for our own studied and impartial judgment.

To isolate "heating and air conditioning representatives" is not the whole story. Engineering service assists us in other trades.

As we have previously pointed out, the so-called specialty engineer has come to represent some of the oldest, best established, and eminently satisfactory lines of equipment. They have also demonstrated to all of us not only the established quality of their respective products, but their individual skill in the specialized field in which they operate. They are trained engineers with a wealth of practical experience in the design and working of all these systems.

Before we as architects reject such skilled engineering assistance and counsel as these men offer, it would have to be demonstrated that by making use of their services we are violating some duty or responsibility which we owe to the clients we serve.

Lorenzo S. Young	Lowell E. Parrish
Raymond Evans	Ashley T. Carpenter
Richard B. Stringham	Robert A. Fowler

Engineers Must Demonstrate

Most engineers will feel that it *can* be demonstrated that architects who depend on manufacturers for engineering are violating a responsibility to their clients, but it is up to the engineers to do the demonstrating, not force the architects to take their engineering services by summarily wiping out the agent-design services that these architects felt to be perfectly qualified.

There is little doubt but that the engineers are in the right in this argument, but they certainly did not go about making their point in a way that would win friends and influence clients. It is going to be many a day before some of the architects in Salt Lake City will feel like working with the consulting engineers. And it could be a long time before some manufacturers are going to have much faith in the responsibility of the Council. It may be that the consulting engineers have won a pyrrhic victory at Salt Lake City.

Consulting engineers, both in association and individually, must continue to work against "free engineering" and "agent-engineering" wherever it is found, but the lesson to be learned from this recent experience is that consulting engineers, architects, and manufacturers all will be better off (as will the clients) if their disagreements can be solved by cooperation rather than accusation. ▲▲

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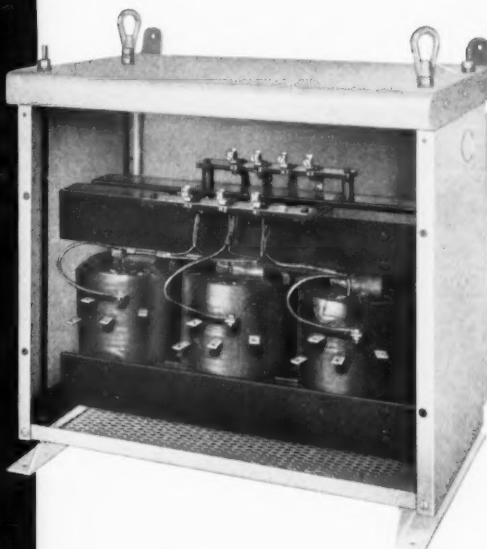


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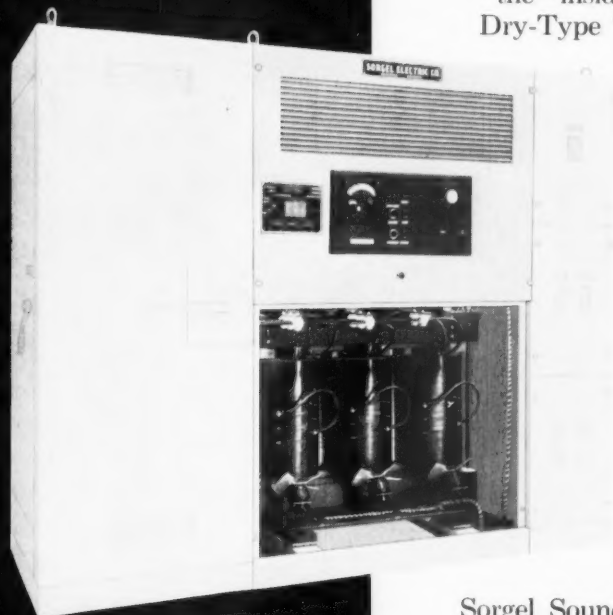
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Impactogear utilizes standard portable air or electric wrenches generally available throughout industry. Example below shows how two typical air wrench ratings can be applied:

Wrench Type No. 1—Stall torque 170 ft-lbs; Free speed 225 rpm; Weight 12 lbs

For 12" and 14" 2500 lb. valves, operating pressures to 3500 psi

For 10" 2500 lb valves, all allowable operating pressures

For 10", 12" and 14" 1500 lb valves, all allowable operating pressures

For 12" and 14" 900 lb valves, all allowable operating pressures

Wrench Type No. 2—Stall torque 200 ft-lbs; Free speed 300 rpm; Weight 38 lbs

For 12" and 14" 2500 lb valves, operating pressures 3500 psi to 4500 psi

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Portable electric wrenches are equally practical. Example below shows a typical electric wrench rating as applied to Impactogear:

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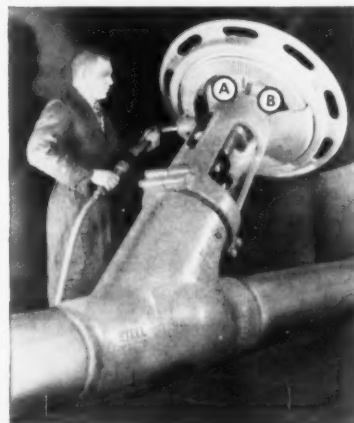
For 10" 2500 lb valves, all allowable operating pressures

For 10" and 12" 1500 lb valves, all allowable operating pressures

For 12" and 14" 900 lb valves, all allowable operating pressures

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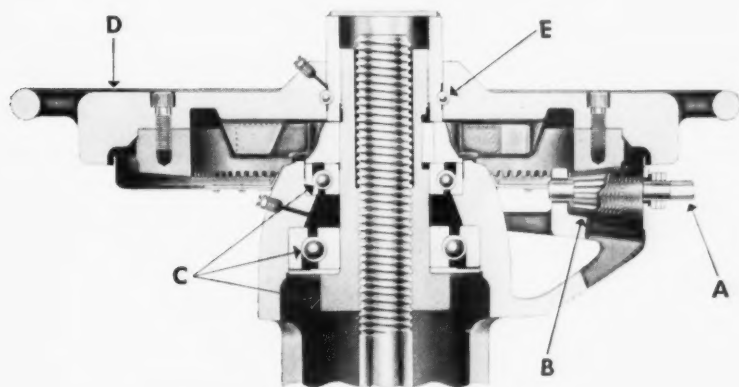
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LIGHTWEIGHT PORTABLE WRENCH can operate as many Impactogear-equipped valves as desired. Or, each valve can be fitted with its own wrench. Either way, you get lower operating costs. Final closing is effected by handwheel lugs (A) striking hammer blows against cross arm keyed to yoke bushing (B). Half of gear cover was removed for illustration purposes.

money by standardizing on Impactogear—radically simple, thoroughly dependable mechanism utilizing existing compressed air or electric facilities. Your Edward Representative will be glad to provide full details and help you determine how Impactogear can work to your best advantage. Contact him—or write Edward Valves, Inc., 1210 W. 145th Street, East Chicago, Indiana. (Subsidiary of Rockwell Manufacturing Company). Represented in Canada by Lytle Engineering Specialties, Ltd., 360 Notre Dame St., W., Montreal 1, Quebec.

*T.M. Reg. U.S. Pat. Off.



Details of new Impactogear and Impactor Handwheel:

A—Hex head of pinion gear shaft. Power wrench is applied here. B—12-to-1 bevel gear ratio is typical for median size handwheel. C—Exclusive EValthrust yoke bushing combines radial and thrust bearings for easy operation and long life. D—New Impactor handwheel concentrates mass near outer circumference for maximum impacting efficiency. E—New extra bearing increases operating efficiency.



Catalog 14 contains full data on the complete Edward line of forged and cast steel valves from ½" to 18", in globe and angle stop, gate, non-return, check, blow-off, stop-check, relief, hydraulic, instrument, gage and special designs; for pressures up to 10,000 lbs. with pressure-seal, bolted, union or welded bonnets, with screwed, welding or flanged ends.

CONCRETE PERFORMANCE REPORT

Pozzolith concrete employed in new Air Force Academy to meet full range of engineering requirements for all types of concrete specified

Largest single construction project in U. S. Air Force history, the Air Force Academy Complex at Colorado Springs marks a milestone in modern concrete design and construction. Nearly 95% of the \$114 million allocated for "pure construction" has gone into nearly 70 major building contracts—including over 4 million square feet of enclosed floor area. Construction at the 17,900 acre Academy site included the placing of some 800,000 cubic yards of concrete for buildings, retaining walls and bridges.

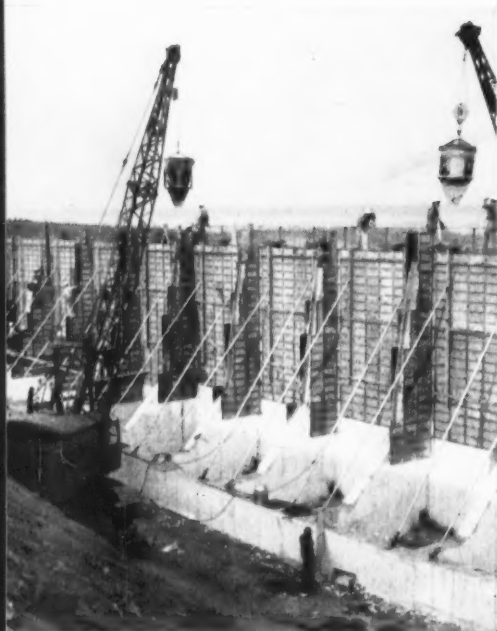
On-site concrete control lab—The Air Force Academy Construction Agency and the architects—Skidmore, Owings, and Merrill—jointly supervised all construction and established an on-site concrete materials control laboratory early in 1956. During July and August, 1956—with only a few thousand yards of concrete placed—they observed erratic and low compressive concrete strengths. The wide range and rapid changes in temperature were suspected as the cause.

Evaluation tests of concrete

free fall of the concrete to 5 feet—maximum permitted by specifications. The mix was easily vibrated into place with no segregation or honeycomb. Retaining walls required approximately 24,000 cubic yards of concrete—supplied by a job site batch plant and delivered in ready-mix trucks. This mix met strength specifications and provided necessary workability for proper placement in the heavily reinforced, narrow forms.

Prestressed bridge girders—Construction work also included the

AIR FORCE



CONCRETE RETAINING WALLS reach 36 feet high over much of the 10,000 foot wall length. Tallest pours were made by giant overhead crane. Walls required approximately 24,000 cubic yards of Pozzolith concrete—a placeable mix of 2" to 4" slump with design strength of 3,000 psi. Contractor: T. F. Scholes, Inc., Reading, Pennsylvania. Concrete Contractor: Long Construction Co., Denver.

materials—In August, they engaged Commercial Testing Laboratories, Denver, to make comprehensive tests of the concrete materials under the range of temperatures being experienced at the job site. Their tests clearly established that POZZOLITH would provide uniform, high strength throughout the wide range of temperature changes experienced between early morning concreting at about 50°F and mid-day concreting at 75° to 80°F. In September 1956, POZZOLITH was first employed in concrete at the Academy. The successful performance of POZZOLITH here led engineers to investigate the use of POZZOLITH for control of other classes of concrete—including lightweight aggregate concrete, prestressed concrete, concrete for bridge decks and structural concrete for retaining walls and buildings.

2-mile retaining wall—Concurrent with concreting of foundation caissons, work began on 10,000 feet of concrete retaining wall that reached a height of 36 feet over much of its length.

Design strength of the concrete required here was 3,000 psi at 28 days. With 1½" top size aggregate, 5 bags of cement, 36 gallons of water and POZZOLITH—a placeable mix of 2" to 4" slump was obtained that readily exceeded the 3,000 psi specification. Tremie trunks were used to limit the

erection of six prestressed bridges varying in length from 144 to 600 feet. There were two railway spans and four highway bridges—their girders standardized at 120 feet long in a modified T design, 71" deep. In all, 128 girders were manufactured. Sixteen shorter girders were erected for the two railroad bridges each of which consists of two simple supported spans of 72 feet each.

Concrete for these girders contained 7½ sacks of Type I cement, 1760 lbs. coarse aggregate (¾" top size), 1300 lbs. sand, 30.5 gallons of water and POZZOLITH Retarder.

This produced a cohesive, workable mix of about 2" slump and 4% entrained air. The POZZOLITH Retarder provided an initial retardation which permitted proper consolidation of the mix, yet accelerated early strength. Specifications called for a compressive strength of 4,500 psi before application of stress. This strength was achieved in three to five days, air cured. Stress was applied at that time. Concrete attained a compressive strength of approximately 6,500 psi in 7 days and well over 7,000 psi in 28 days.

Concreting bridge decks—Initial retardation was required in the concrete bridge decks to provide an initial delay in hardening so that the complete deck for each span could be completely



AERIAL VIEW of nearly completed Air Force Academy. Construction under supervision of the Air Force Academy Construction Agency. Architects: Skidmore, Owings & Merrill, Chicago • Contractors include: Jack Adams & Haake Construction Co., Santa Fe, New Mexico • B. H. Baker Co., Inc., Colorado Springs • J. W. Bateson Co., Inc., Dallas • T. C. Bateson Construction Co., Dallas • A. H. Beck Foundation Co., San Antonio • Colorado Constructors, Inc., Denver • Dondlinger & Sons Construction Co., Inc., Wichita • E. & M. Construction Co., Denver • Elgas Construction Co., Colorado Springs • Farnsworth & Chambers Co., Inc., Houston • A. S. Horner Construction Co., Denver • Peter Kiewit & Sons' Co., Denver • Wade Lahar Construction Co., Tulsa & Denver • Long Construction Co., Denver • Matelich & Hanson, Inc., Englewood, Colorado • Robert E. McKee, Inc., Santa Fe, New Mexico • Mountain States Construction Co., Denver • Nowers Construction Co., Pueblo, Colorado • Frederick Raff Co., Colorado Springs • Ramsey-Leftwich, Lubbock • Saxet Foundation Co., San Antonio • T. F. Scholes, Inc., Reading, Pa. • Del E. Webb & Rubenstein Construction Companies, Phoenix • J. F. White Engineering Co., Englewood, Colorado • POZZOLITH Ready-Mixed Concrete: Concrete Materials, Inc., Kansas City • General Concrete Co., Colorado Springs • Transit Mix Concrete Co., Colorado Springs.

economically, for the broad range of job requirements and varied climatic conditions encountered at the site.

The Master Builders field men and the Company engineering staff worked closely with project engineers, the field control laboratory, contractors, and concrete suppliers to achieve the common goal of uniform, superior quality concrete at lowest cost-in-place.

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On any current or future concrete projects, the local Master Builders field man will welcome discussing your requirements. Call him in. He's at your service—and expertly assisted by the Master Builders research and engineering staff—unexcelled in the field of concrete technology. Write us for complete information.

ACADEMY

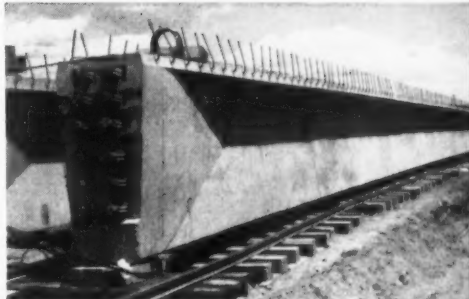
poured before initial set occurred. This permitted full dead load deflection and achieved true composite action between girders and the concrete deck. Because the contractor wanted to use the completed decks as work areas in placing girders for the remaining spans, it was important that these slabs be placed into service at an early date. POZZOLITH Retarder provided the required, controlled initial delay in hardening and produced early strengths equal or better to what could be expected with a comparable plain concrete mix. At placing temperatures below 50°F, no extended delay in hardening occurred.

Lightweight concrete—Design of many of the buildings included lightweight aggregate concrete floors for the second, third and fourth stories—and concrete roofs. Preliminary mix designs indicated that with local light-

weight coarse aggregates, natural sand for most of the fine aggregate and POZZOLITH—the 3,000 psi compressive strength specification could be met with 5 sacks of cement and air content maintained at $9\% \pm 1\frac{1}{2}\%$. This lightweight concrete had excellent workability and weighed approximately 105 lbs. per cubic foot, well below the 110 lb. maximum specified.

POZZOLITH and Master Builders field service—POZZOLITH was an important aid in meeting and exceeding specification requirements in over 750,000 of the 800,000 cubic yards of concrete at the Air Force Academy. For each of the many classes and types of concrete specified—it provided the required batch-to-batch uniformity, most

*The Master Builders Company, Cleveland 3, Ohio • Division of American-Marietta Company
The Master Builders Company, Ltd., Toronto 9, Ontario • International Sales Department,
New York 17, New York • Branch Offices in all principal cities.*



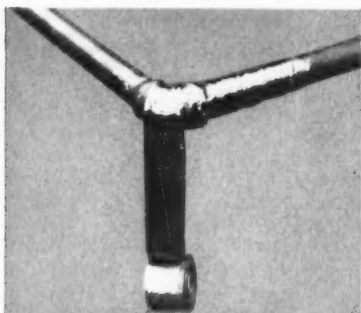
PRESTRESSED CONCRETE BRIDGE GIRDERS attained 28-day compressive strength of over 7,000 psi. Construction of all 144 POZZOLITH girders was by A. S. Horner Construction Co., Contractors, Denver. Consulting Engineer: L. Boduroff, Denver. Prestressing: Prescon Corp., Corpus Christi, Texas.

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The Word From Washington

EDGAR A. POE

Consulting Engineer Correspondent

THE EISENHOWER administration has tossed a stumbling block in the path of the Keogh-Simpson self-employed retirement bill. Secretary of the Treasury Robert B. Anderson warned Congress that passage of the measure would give a special tax deferment to self-employed persons which wage earners do not have. He said the plan would cost the Treasury \$365 million a year.

TVA Revenue Bond Issue

The Tennessee Valley Authority is making an all-out effort to get Congress to approve its revenue bond issue up to \$750 million. The measure is destined to encounter tough sledding, but its chances of passage are considerably better than during the 85th Congress. The National Society of Professional Engineers, as it has done previously when the measure was up, registered its opposition to a provision in the bill. NSPE, without taking a stand on the merits of the measure, told the House Public Works Committee it opposes authorization to TVA to

render engineering design services for non-Federal and non-TVA interests. Furthermore, the Society said emphatically the government should not compete with private enterprise where the independent practice of the engineering profession is concerned.

Japanese Steel

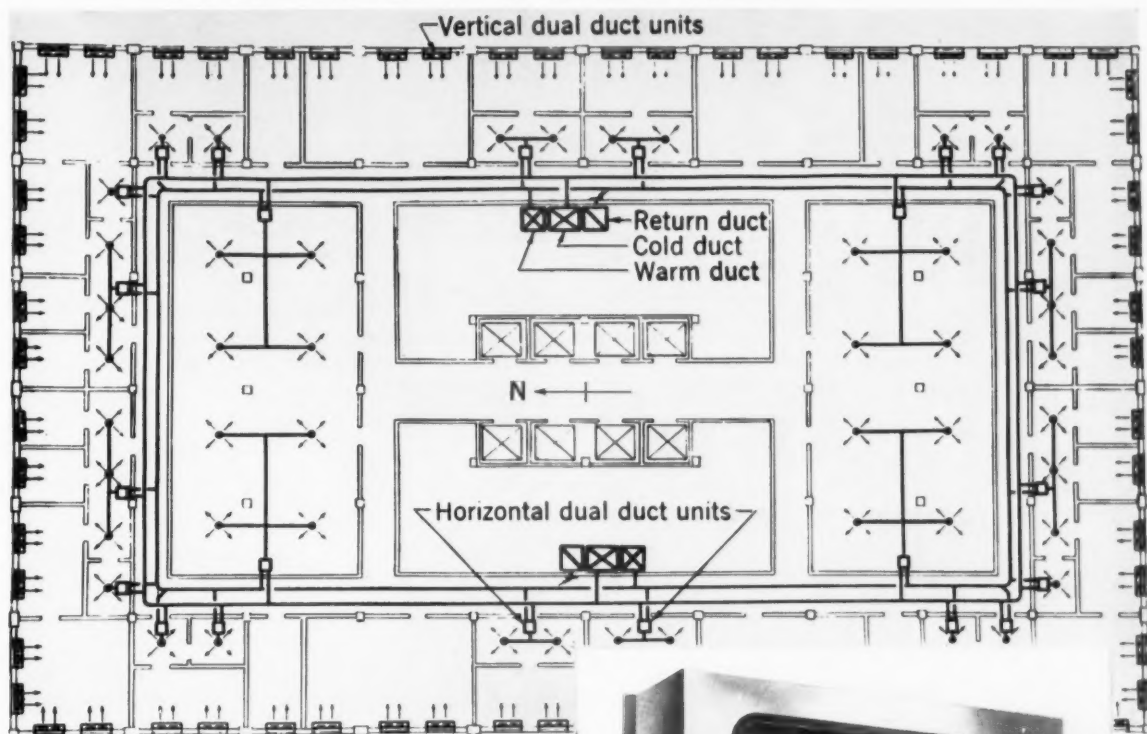
One of the worries facing the government is the question: Are we pricing ourselves out of business? Japan, with its hard workers and its lower standard of living, can buy scrap iron in this country, ship it to Japan, make it into steel, ship it back to this country, and still compete with the steel from the mills in this country.

Overseas Investments

The trend toward increasing U. S. capital investments abroad still is gaining impetus. Here is the current scoreboard:

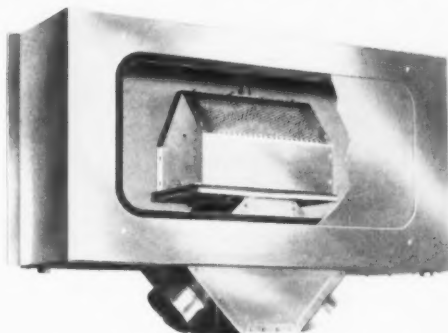
¶ Last year the Export-Import Bank of Washington received authority to increase its lending authority an

HOW TO "BALANCE A BUILDING" BEFORE IT'S BUILT:



Shown above is a typical office building dual duct layout, 100 per cent air system. It is zoned to provide selective temperature control for each enclosure with Buensod vertical dual duct units at exterior walls. These under-window units may be connected to vertical risers, or to horizontal mains at the ceiling or on the floor below.

Illustrated: Buensod Type V window-wall unit with cut-away showing automatic volume control. This unit is designed for installation under windows to discharge vertically upward, quietly and without draft.



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The secret is in Buensod's proven Automatic Volume Control. A simple tent-like apparatus maintains con-

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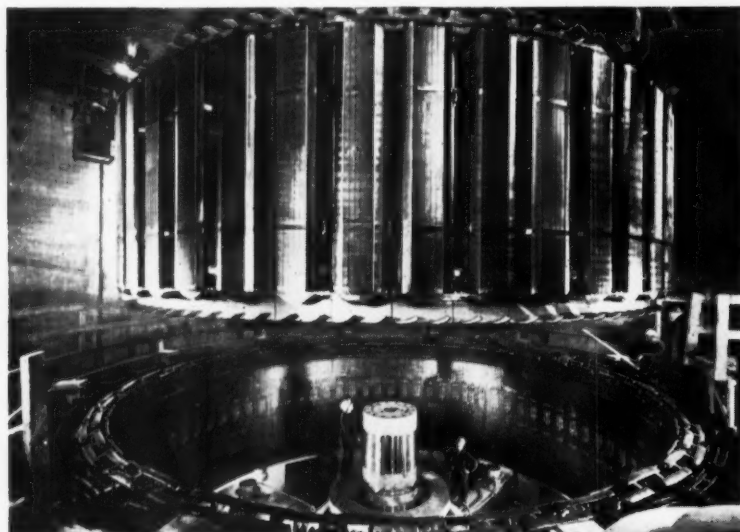
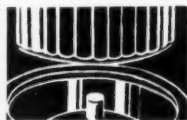
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additional \$2000 million to a total of \$7000 million.

¶ A U. S. Government corporation, Development Loan Funds, was created within ICA to aid individuals and governments to develop their economic resources and productive capacities. Thus far DLF has made or approved in excess of 71 loans totaling about \$700 million to public and private borrowers in 33 different countries.

¶ Every indication is that Congress is going to give support and assistance to increase the capital structure of the World Bank to \$20,500 million, double the present amount. When this action takes place, the World Bank obviously will be able to accelerate its lending program.

¶ Proposals to encourage private investment are pending before Congress. One would double the \$500 million limit on insurance for private investors. This measure would increase confidence by protecting investors who might lose their investment through a revolution, a war, or an expropriation by a foreign government. Other proposed inducements would include a reduction in United States taxes on business profits that are earned and retained abroad.

Growth South of the Border

The Pan American Union in Washington says the 20 Latin American countries have blueprinted heavy construction projects totaling more than \$16,000 million. Incorporated in the plans are projects for electric power development, transportation, mining, and hydraulic installations. Of the total, about \$3400 million will represent power projects in 18 republics. All 20 will step up their road construction programs.

A loan agreement, signed recently by the Export-Import Bank of Washington and Nacional Financiera, S.A., an agency of the Mexican Government, also is indicative of the industrial growth south of the Rio Grande. The Mexican Government guarantees the seven-year loan, which extends a credit of \$100

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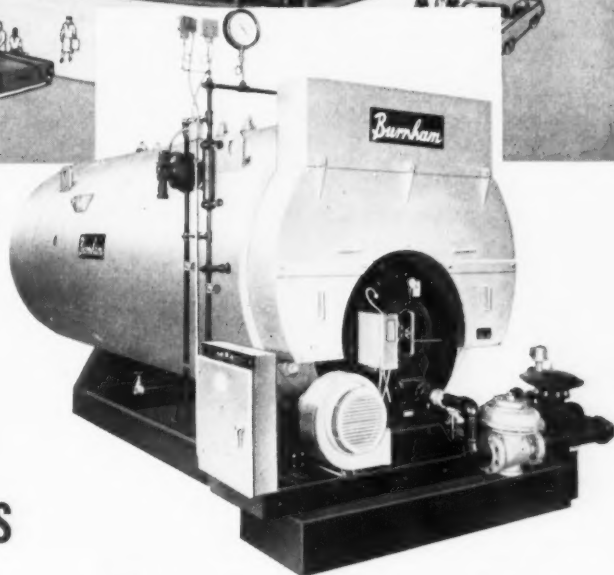
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million to assure Mexico of essential imports of capital goods.

With this rising standard of living in Central and South America, the market for United States industrial goods will grow. Members of Congress and officials of the executive branch of the government also recognize that with the stepped up industrialization there is an increasing need for consulting engineers to provide technical assistance and engineering.

Financing of Small Businesses

The Small Business Administration has launched its pioneering effort in the financing of business enterprises through formation of privately owned and privately operated small business investment companies. More than 50 proposals for creating small business investment companies under the 1958 Act have been submitted, but thus far only a few have started doing business. Licensed companies will make loans and purchase deben-

tures of the small business concerns. Licensed companies must have a minimum of \$300,000 for paid-in capital and surplus but the Small Business Administration can put up \$150,000.

Deuterium by Distillation

The National Bureau of Standards' Cryogenic Engineering Laboratory, at Boulder, Colorado, has advanced a practical solution for separating hydrogen isotopes. A pilot plant capable of distilling liquid hydrogen by fractionation has yielded promising amounts of pure deuterium. The demand for deuterium is growing rapidly.

Designed by Cryogenic Engineering Laboratory staff members T. M. Flynn, K. D. Timmerhaus, and D. H. Weitzel, the unit is the only one in the nation. The designers express confidence it is feasible for industry to produce large quantities of deuterium by this cryogenic (low temperature) distillation method. It is particularly well

suited in industrial areas where extensive supplies of hydrogen gas are available—for example, near ammonia plants.

Declassification of thermonuclear fusion research programs recently has shown deuterium to be one of the most promising fuels of the future, the Bureau says. Furthermore, heavy water has been regarded as one of the most desirable nuclear reactor moderators since the early Manhattan Project days. At that time, unavailability and economies restricted its use. At present, synthesis of heavy water is carried out on a commercial scale.

Progress in Marine Reactors

Congress has before it testimony by Francis K. McCune, vice president of General Electric Company, telling of his company's two-year study of boiling water reactors for maritime ship propulsion. Recently General Electric agreed to undertake for the Atomic Energy Commission a further design study for

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TYPE PR Pressure Relief Ventilator. Capacities: From 28.28 to 1866.5 sq. in. throat areas.

FEATURES:

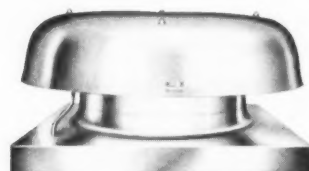
All-aluminum construction. Inverted cone eliminates air turbulence. Can be used as air intake, in some cases.



TYPE QD Direct-Drive Propeller Ventilator. Capacities: From 1200 to 38,350 cfm.

FEATURES:

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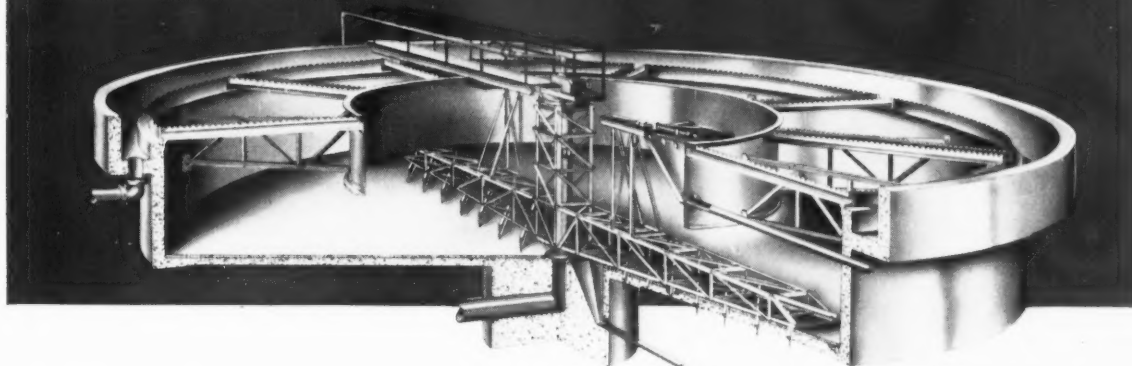
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Specifically designed to handle waste flow surges yet operate efficiently during periods of low flow, the Flotator-Clarifier represents a new concept in clarification. Through a combination of dissolved air flotation and conventional sedimentation in a single tank, all types of solids—settleable, floating and those which tend to remain in suspension—are rapidly removed. Septicity and odor formation are minimized, and suspended solids, C.O.D. and B.O.D. removals equivalent to those of a conventional clarifier are obtained in about half the tank area.

The Flotator-Clarifier is available in a variety of types, sizes, modifications, and

with complete or partial pressurization. It is ideally suited to primary clarification in sewage treatment; oil, grease and other suspended solids removal from trade wastes; and removal or recovery of finely divided solids and low specific gravity liquids from industrial process streams.

This Eimco-Process design innovation has been proved in a number of installations operating with excellent results. If you are concerned with the treatment of sewage or wastes with widely varying flows or composition, it will pay you to consider use of the Flotator-Clarifier. You will find no other equipment possesses its economy, flexibility and wide application.

Cutaway drawing of Type C Flotator-Clarifier, a center column supported unit suitable for tanks to 100 ft. diameter. Beam supported mechanisms are available for smaller tanks.



Flotator-Clarifier, a center column supported unit suitable for tanks to 100 ft. diameter.

Bulletin SM-1008 covers design features of the Flotator-Clarifier. Bulletin B-292 describes the Isleton installation, shown below, in more detail. Copies are yours on request.

THE EIMCO CORPORATION
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B - 419

Isleton installation, shown below, in more detail.

. . . another outstanding installation

Partial feed pressurization and recirculation are features of this 32 ft. dia. Flotator-Clarifier at the Isleton, California, primary sewage treatment plant. The unit provides proper treatment of seasonal peak loads of cannery wastes, yet operates during periods of low flow without creating septic or malodorous conditions. Solano Engineers Associated, Vallejo, Calif., were the consulting engineers responsible for the design of this plant.



a complete nuclear propulsion system for a larger tanker. Said McCune, "Our studies show that maritime applications are ready for serious development though this is not true yet in the great bulk of short-run passenger and small freight vessels."

Omnibus Housing Bill

A tremendous omnibus housing bill providing for about \$2300 million for a three-year period is likely to reach the White House. Unless a compromise is reached the measure probably will run into a presidential veto. The Eisenhower administration recommended an omnibus housing measure not to exceed \$1600 million.

Federal Aid for Sewage Plants

Congress is debating whether to provide more or less Federal funds to encourage communities to build sewage plants. President Eisenhower wants the present \$50 million of Federal grants reduced to

\$20 million for fiscal 1960, and after that let the states take over the program. On the other hand, some members of Congress are seeking to raise the Federal grant ceiling to \$100 million.

Defense Department Reports

A name that will be more and more in the news in the months and years ahead is that of Dr. Herbert F. York. Defense Secretary Neil H. McElroy says Dr. York is the Department's top military and missiles and space official. The 37-year-old expert is heading a new Pentagon post, director of research and engineering. He will head all research and engineering activities at the Defense Department and will advise the Defense Secretary on scientific and technical matters, basic and applied research, and design and engineering. President Eisenhower says the country is fortunate to have him to head the new office.

The Defense Department's comptroller, Wilfred J. McNeil, also re-

ports that defense spending, in the absence of a shooting war, will move ahead about \$1000 million a year for the next few years. He doubts that spending will skyrocket, but it will rise gradually.

Hawaiian Statehood

Hawaiian statehood will mean a series of changes; more industrialization of the Islands looms ahead. Hawaii's population is greater than either Delaware, Vermont, Nevada, Wyoming or Alaska, and is equal to that of Montana or Idaho. Some qualified observers and economists in Hawaii predict a population of one million for the Islands by 1975.

Indemnity Legislation

A bill providing indemnification legislation for manufacturers of aircraft, missiles, and space craft is pending in Congress. Manufacturers and their engineers maintain that this legislation is necessary in view of the fact that every large defense contractor in this field is

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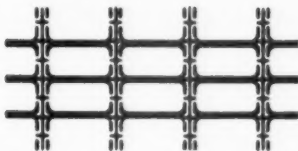
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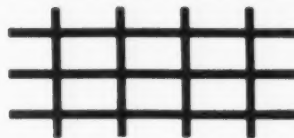


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gambling with bankruptcy because of the unusual risks involved. Damage claims from a single accident could wipe out a corporation. The Government's obligation for any single accident would be limited to \$500 million.

Air Pollution

The United States Public Health Service says that more and more American cities are preparing to attack air pollution problems, and Congress is being asked to provide an impetus for a stepped up nationwide clean air program. The Public Health Service says flatly that incidence of cancer of the lung and stomach is greater among city dwellers than among rural residents, because the air is purer in rural areas where the concentration of fumes from automobile exhausts and industries is far less.

Under present law, the Public Health Service has an annual authorization of \$5 million for its air pollution research. Thus far Con-

gress has not appropriated the full amount, but some members of the Senate and House appropriations committee favor the full amount for fiscal 1960.

Meanwhile, engineers have at hand most of the research and even the equipment necessary to greatly curb and, in some instances, to eliminate most of the poisons in the air. Unofficial estimates are that industry is spending more than \$325 million a year installing and maintaining air pollution equipment. This sum will be doubled in 10 years, according to a number of qualified observers.

Movement of Industry

Commerce Department officials predict that the industrial movement to the South, Southwest, and the Pacific Coast appears likely to continue for several years. The movement got underway during World War II, and has been continuing steadily ever since. A warmer climate, a good labor sup-

ply, availability to raw materials, and lower building costs have aided the migration.

Interstate Highway Program

Congress still is wrestling with the highway financial crisis. Federal Highway Administrator Bertram D. Tallamy has reiterated his warning that unless additional funds are provided it will be necessary for the Bureau of Roads to forego any apportionment of Interstate funds next year. Some members of Congress said they have had surprisingly little mail on the subject. On the other hand they said they received a substantial amount of mail in opposition to raising the Federal gasoline tax an additional 1½ cents a gallon.

A. C. Leonard, chief of the Bureau of Public Roads' secondary road branch, says Bureau records show that for every million dollars of total cost, about 100,000 tons of aggregate are used in Federal-highway construction. ▲▲



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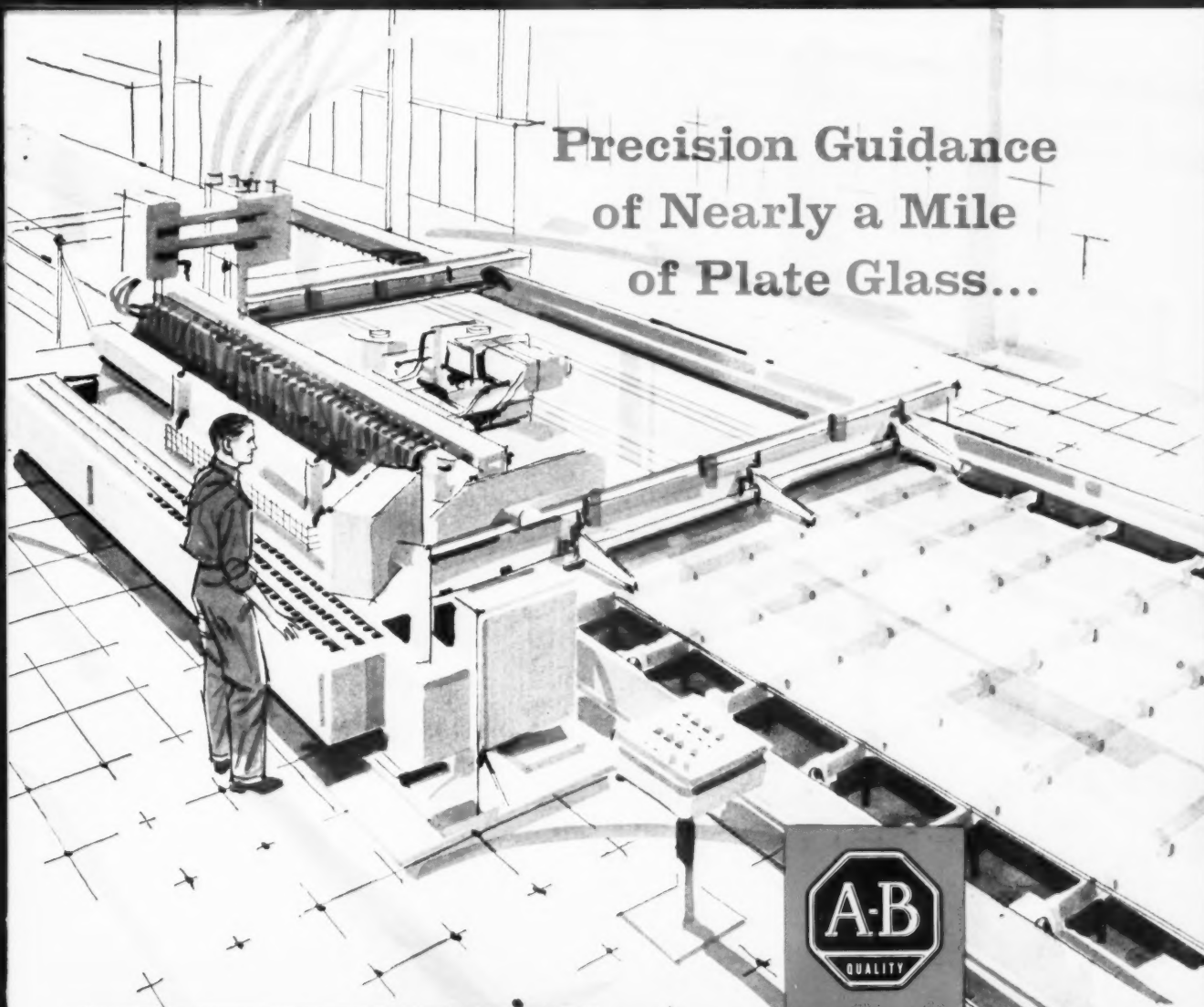
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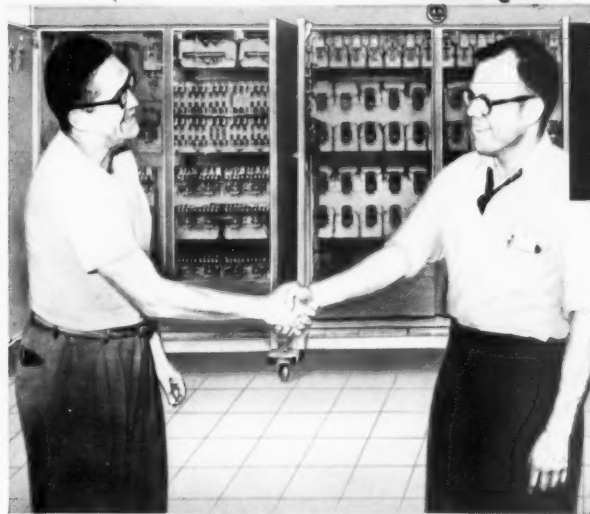


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A series of control panels such as this is used in the Pittsburgh Plate Glass cutting room. Above are shown the Allen-Bradley engineers after completing the factory testing of the final panel.

The New Pittsburgh Plate Glass Plant at Cumberland, Maryland, heralds a new era in the art of plate glass making. Night and day, a continuous ribbon of glass is fed to a nearly mile-long process line. Then a complex control system directs the automatic cutting, sorting, and conveying of the glass to six areas, according to a continuously varying program.

Special control panels which integrate portions of this equipment into a unified, smoothly operating system were designed, developed, and engineered by Allen-Bradley. You can benefit by this extensive control experience . . . it is a "plus" value when you specify Allen-Bradley *quality* motor control.

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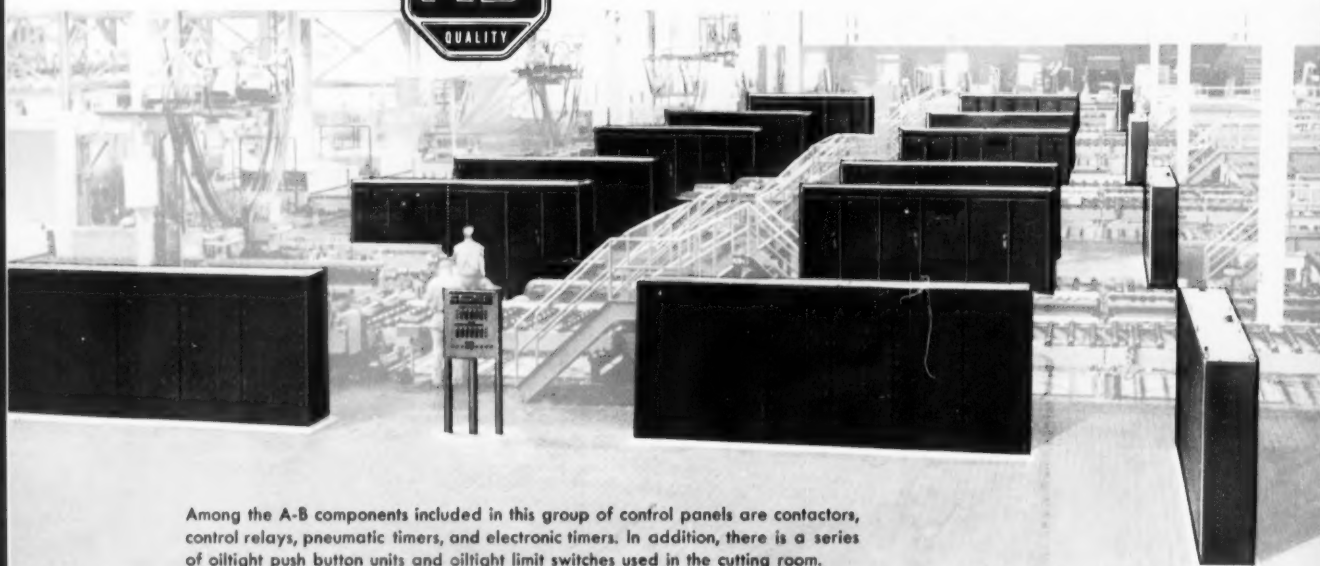
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See on the next page how A-B Controls do it...

Plate Glass made by the mile with reliable **ALLEN-BRADLEY** Controls



In the cutting room at Pittsburgh Plate Glass (below), Allen-Bradley controls prove the reliability of their "simple design." All A-B solenoid starters, contactors, and relays have only **ONE** moving part . . . assuring *millions* of trouble free operations. There are *no* bearings or jumpers to cause trouble. Contact maintenance is also eliminated — A-B double break, silver alloy contacts remain in perfect operating condition until completely worn away. Insist on Allen-Bradley *quality* motor controls . . . you cannot do better!



Among the A-B components included in this group of control panels are contactors, control relays, pneumatic timers, and electronic timers. In addition, there is a series of oiltight push button units and oiltight limit switches used in the cutting room.

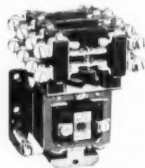
Some of the standard components which are used in this plant



Contactor—Bulletin 702, Size 3 shown. Made up to Size 8, rated 1350 amps, 220-550 v.



Solenoid Starter Bulletin 709, Size 2 shown. Made in ratings to 450 hp, 220v; 900 hp, 440-550 v.



Control Relay—Bulletin 700. Universal type relay with both N.O. and N.C. contacts shown.



Limit Switch—Bulletin 802T. Oiltight roller lever type shown. Also with many other operators.

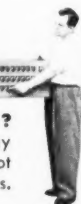


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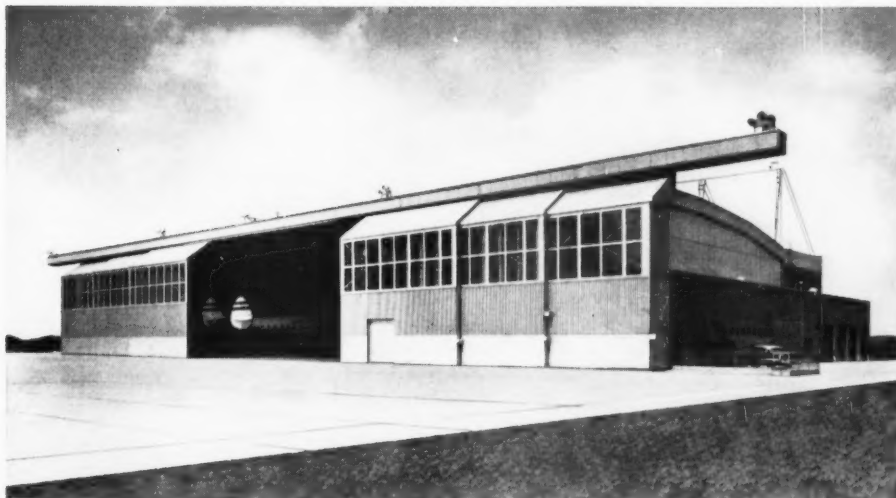
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In the two hangars illustrated, for example, there is considerable difference both in size and structural design. Both, however, are equipped with Byrne doors . . . in Philadelphia, providing a door opening 276 feet wide by 46 feet high . . . in Kansas City, 814 feet wide by 51 feet high. The same door design principle—with a

slanting portion hinged to the top of the door to provide compensation for the specified building deflection—was applied in each installation.

If a hangar design is on your boards—or will be in the near future—you'll find it well worth your while to consult Byrne engineers now. You'll get the benefit of more than 30 years' specialized experience in the development and manufacture of hangar doors.

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Good fabrication and welding properties of "T-1" Steel saved time and money in the shop and on location.

USS "T-1" Steel cuts weight of biggest turbine scroll cases 50%

A SCROLL CASE looks like a giant sea shell. Water gushes into it from a high level reservoir. Through the conch, the water swirls in an ever-tightening spiral into the blades of water turbines. Because the cross section of the spiral passage diminishes, the water pressure and velocities are built up for efficient power generation. Four of these scroll cases, the largest in the United States, have been built from USS "T-1" Steel by the Chicago Bridge & Iron Company. They are installed in the Noxon Rapids Dam, an \$87 million project now under construction by the Washington Water Power Authority to harness the waters of Clark Fork River. The dam is located on the site of a prehistoric lake in western Montana.

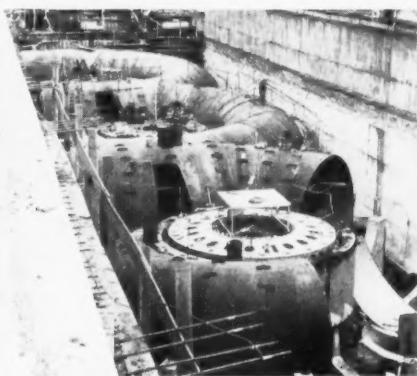
Because of the fierce pressure and

erosive action of the water, it was obvious that a very strong, abrasion-resisting steel was required. USS "T-1" Constructional Alloy Steel not only met these requirements, but permitted a reduction of about 50% in plate thickness.

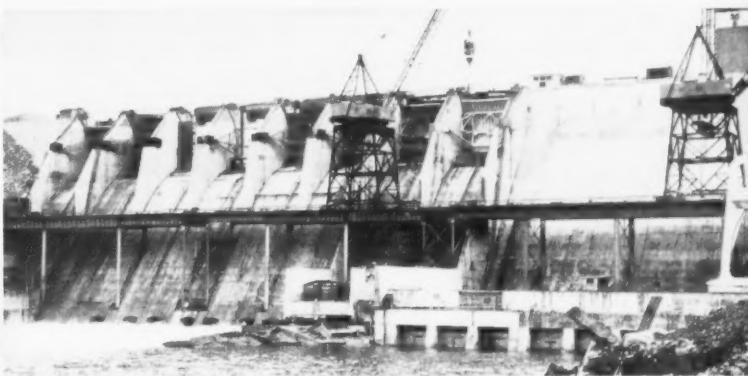
COST SAVINGS. By using USS "T-1" Steel, there was substantially less weight of material to ship across the country. Weld time and weld metal were reduced. Foundations could be made smaller.

This job points up the economies possible with the use of USS "T-1" Steel: lighter weight, greater strength, weldability and resistance to impact abrasion. Write for our "T-1" Steel book containing complete information. United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

USS and "T-1" are registered trademarks



Nation's largest scroll cases. Built with USS "T-1" Steel to obtain maximum strength with the least weight. Largest diameter is 24 feet with a speed ring about 28 feet in diameter.



Noxon Rapids Dam, a new \$87,000,000 power project by the Washington Water Power Authority to harness the waters of Clark Fork River in western Montana. General Contractor: Morrison-Knudsen Company.

United States Steel Corporation - Pittsburgh
Columbia-Geneva Steel - San Francisco
Tennessee Coal & Iron - Fairfield, Alabama
United States Steel Supply - Steel Service Centers
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United States Steel



NEW

Acme COOLING TOWERS

AND OTHER WATER-SAVING EQUIPMENT

Choose Acme and get exactly the condensing equipment you need for efficient economical operation. The new Acme outdoor cooling tower shown at the right, for instance, completes the Acme line of water-saving equipment with a tower that is smaller, lighter and more efficient than any other on the market today. Think of the saving in supporting structure costs, in erection costs, in maintenance. And the new Acme outdoor cooling tower can easily be disassembled and reassembled in the field for easier, lower cost erection on rooftops and in other inaccessible places.

Every piece of Acme condensing equipment, like

all products in the new Acme line, is built to give you more capacity in less space . . . more value for your air conditioning dollar.

Complete Acme Systems

Acme offers a wide choice of equipment from which to build a complete system exactly suited to your needs. You can get either wet or direct expansion cooling with a wide choice of air handling equipment and water-saving condensing equipment. Get the full story on the equipment you need from your nearby Acme sales engineer or write directly to the factory.

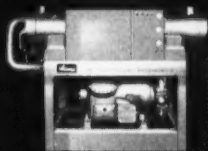
Acme

INDUSTRIES, INC.

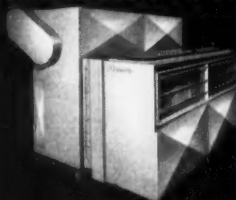
JACKSON, MICHIGAN

Manufacturers of quality air-conditioning and refrigeration equipment since 1919

COMPLETE ACME SYSTEMS FOR EVERY AIR CONDITIONING NEED



Packaged Water Chillers
1 $\frac{3}{4}$ to 60 tons with hermetic compressor. 20 to 125 tons with direct drive compressor.



Air Handling Equipment
665 to 36,000 cfm capacity in single and multi-zone models. Complete group of accessories.



Remote Room Conditioners
200 to 600 cfm capacity in horizontal and vertical models with and without cabinets.



Packaged Air Conditioners
3 to 60 tons capacity, air or water cooled. Heating coils and full line of accessories.

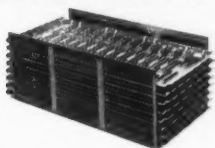
Acme

...the **practical** approach to air conditioning

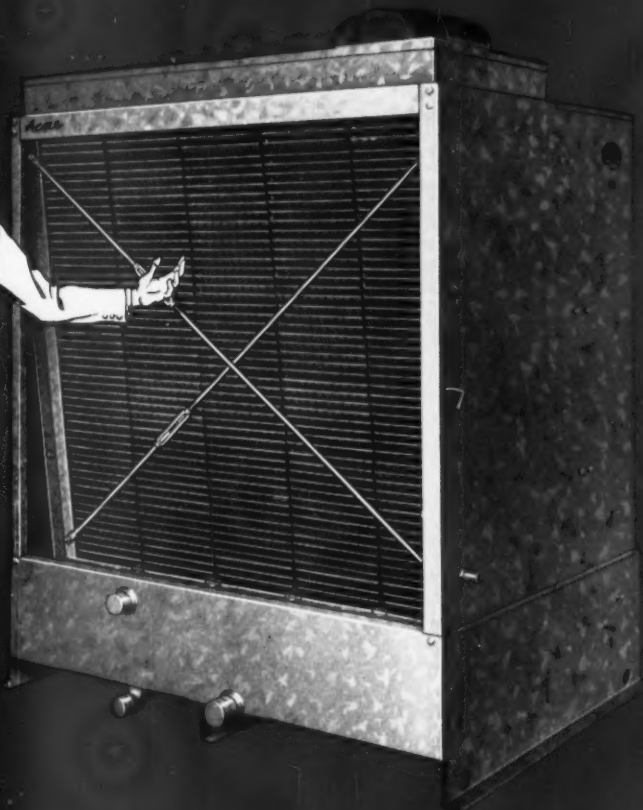
- * UP TO 50% SMALLER
- * UP TO 50% LIGHTER
THAN ORDINARY TOWERS



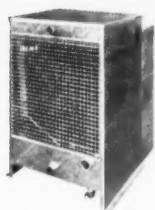
THE SECRET OF *Acme* TOWER EFFICIENCY



A unique plastic distributing trough which makes up the pack of this Acme cooling tower, crams more evaporating capacity into less space because the drip pattern and air flow can be precisely controlled to produce optimum evaporating conditions. The plastic will not warp or support fungus growth so efficiency remains high over years of service. Because of building block construction, the tower can be dismantled and re-assembled in the field for easier installation and servicing.

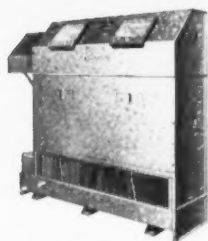


Capacities—20-120 tons



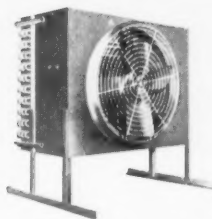
Small Cooling Towers

3 to 20 tons capacity for either indoor or outdoor use. Plastic pack means permanently high efficiency combined with minimum weight and space.



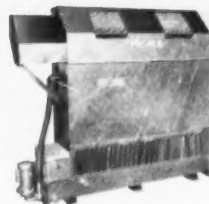
Large Cooling Towers

20 to 175 tons capacity for indoor or outdoor use. Centrifugal fans for maximum air movement. Plastic deck for light weight and high efficiency.



Air Cooled Condensers

3 to 100 tons capacity. No water required. Turbair fin design increases heat transfer efficiency as much as 15% to give more capacity with less size.



Evaporative Condensers

Up to 200 tons capacity. Staggered tube coils improve air circulation and turbulence, provide maximum evaporation rate in minimum space.



Atoms in Action

JOHN F. LEE

Broughton Professor and Head
Department of Mechanical Engineering
North Carolina State College

The Economics of Nuclear Power

RUMBLINGS CAN BE HEARD throughout the world about the economic aspects of nuclear power. Some of the earlier optimism for economic nuclear power has been shattered completely now that we have had an opportunity to look objectively at the costs. One result of this closer scrutiny of actual nuclear power costs is a concerted effort to re-evaluate the

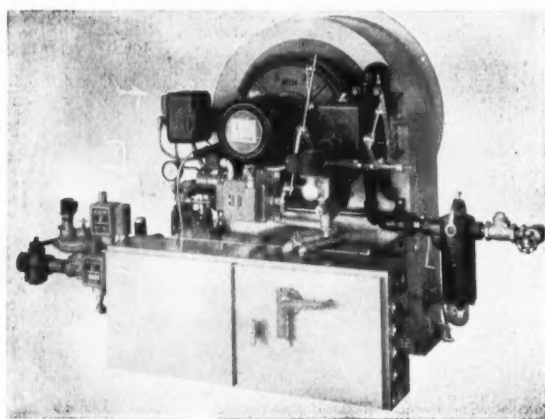
components of major stations to determine how essential each one is to safe and efficient operation. Also being examined carefully are some of the conservative limitations placed on operating levels of nuclear power reactors in the light of advanced technology and new knowledge.

In some countries, faith in the achievement of economic nuclear power has resulted in an all-out effort. In others, all bets are hedged. In still others, private development of nuclear power is declining, with the governments being asked to assume a larger role in assuming capital risks. Currently it is clear that the sale of nuclear power facilities in countries with abundant resources of fossil fuels will require a hard sell. In countries critically short of fossil fuels, a ready market for nuclear power plants exists, but the competition is brisk.

International Competition

The Japanese government has allocated a total of \$84 million for developing, equipping, and constructing a number of nuclear power stations. However, the bids received for the first station exceed this amount by about \$3 million. Three British firms — namely Associated Electrical Industries, English Electric, and General Electric Company — have been engaged in a Dutch auction, in which the Japanese government was hoping to get bids that were within the budget.

One of the British firms had adopted a simpler construction which permits the substitution of a pair of 15-ton cranes for the huge overhead cranes usually employed in large nuclear power plants. This substitution results in a saving of over \$1



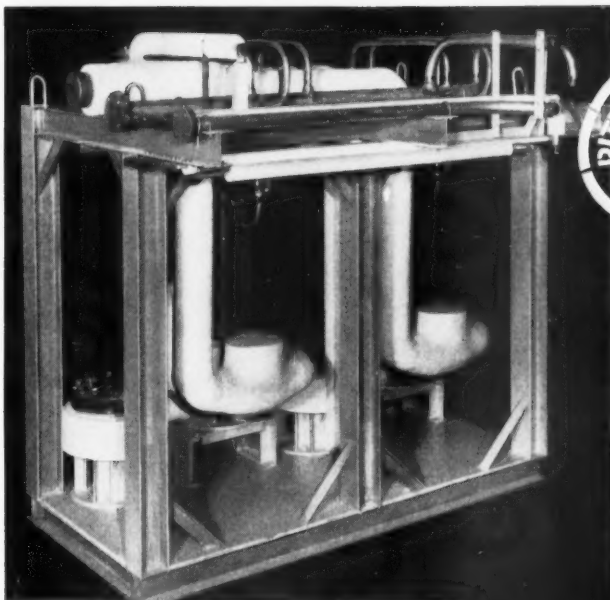
JOHNSON Forced Draft BURNERS

For firing with Oil only . . . Gas only . . . or Combination Oil or Gas. Wired, tested and completely assembled at the factory ready for easy, inexpensive attachment to any boiler or heat receiver. They provide smoother, more efficient combustion regardless of stack conditions and firebox pressure variations. Powered by the famous Johnson Mod. 53 Burners, these "packaged" units are available for any heating need, in sizes from 28HP to 560HP.



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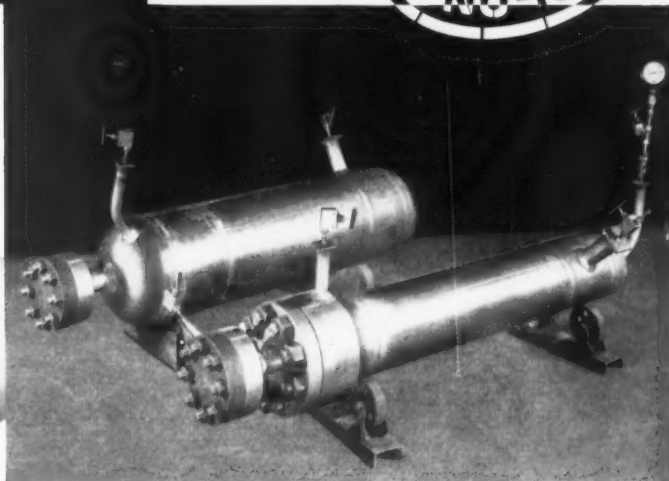
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One of a battery of stainless steel test loops fabricated at Pittsburgh Piping. Shown insulated; ready for shipment.



Stainless steel de-mineralizers—larger unit is 14" in diameter; its wall thickness is 1½".



PP-39

Fabricated by Pittsburgh Piping for Nucleonics

The stainless steel test loop and the de-mineralizers shown above are typical of the nucleonic piping work that goes through Pittsburgh Piping shops.

This type of fabrication is a "natural" for us. We pioneered the application of austenitic steel piping materials for central stations

operating at 1050°F and above, and fabricated piping for America's first atomic-powered submarine and central station. Today we are producing a wide variety of piping components for leading builders of nuclear energy installations. We invite you to inspect our plant, meet our people, and use our facilities on your nucleonic jobs.

PIONEER FABRICATOR OF HIGH PRESSURE PIPING FOR NUCLEONICS



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What **ONE** Type of Pipe Can Fill **ALL** Piping Requirements?



ANSWER:

NONE, of course. **NO ONE** Type of Pipe is **BEST** for **ALL** applications.

SOUTHWESTERN PLASTIC PIPE COMPANY offers you a full line of quality-controlled plastic pipe that will meet many of your piping needs.

SOUTHWESTERN PLASTIC PIPE possesses certain characteristics which are of particular interest to engineers:

- NON-AGING—no physical deterioration
- HIGH IMPACT STRENGTH—withstands shock loads
- NON-INFLAMMABLE—safe to install where fumes may be a hazard
- RESISTS SCALE—and other build-up; maintains high-flow capacity
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- NON-MAGNETIC—and immune to galvanic corrosion
- FULL RANGE OF SIZES— $\frac{1}{4}$ " through 12" diameters

SOUTHWESTERN PLASTIC PIPE has been proven in these and many other applications:

- Conduit for electrical and communication lines
- Potable water lines
- Transmission of corrosive materials and wastes
- Brine circulation lines
- Natural gas lines
- Air conditioning tubing
- Sewage drain lines

With SOUTHWESTERN, you deal with a pioneer in the industry, backed by more than 50 years' experience in making pipe.

Write, wire or call for complete information



SWP-21

million. Another British firm hoped to increase the operating temperature of its reactor and thus reduce the size of pressure vessels, with significant savings in costs. English General Electric came up with a new safety idea using steel balls that roll into the reactor if the control rods jam in an earthquake. They were awarded the contract.

The biggest bulk supplier and processor of nuclear fuels, aside from the United States, is the United Kingdom. The British have been smart, both in not attaching political strings to the sale of nuclear fuels and in not restricting the use of these fuels to British-built reactors. In fact, the United Kingdom signed a written agreement with Euratom to provide nuclear fuels to member nations.

Lately the French have announced that a hitherto secret fuel processing plant is producing nuclear fuels for sale in competition with the British. This is a matter of concern to the British for two reasons. The French can sell their fuels under any conditions they wish to establish. Furthermore, the French have developed a cheaper processing technique and the competition promises to be severe.

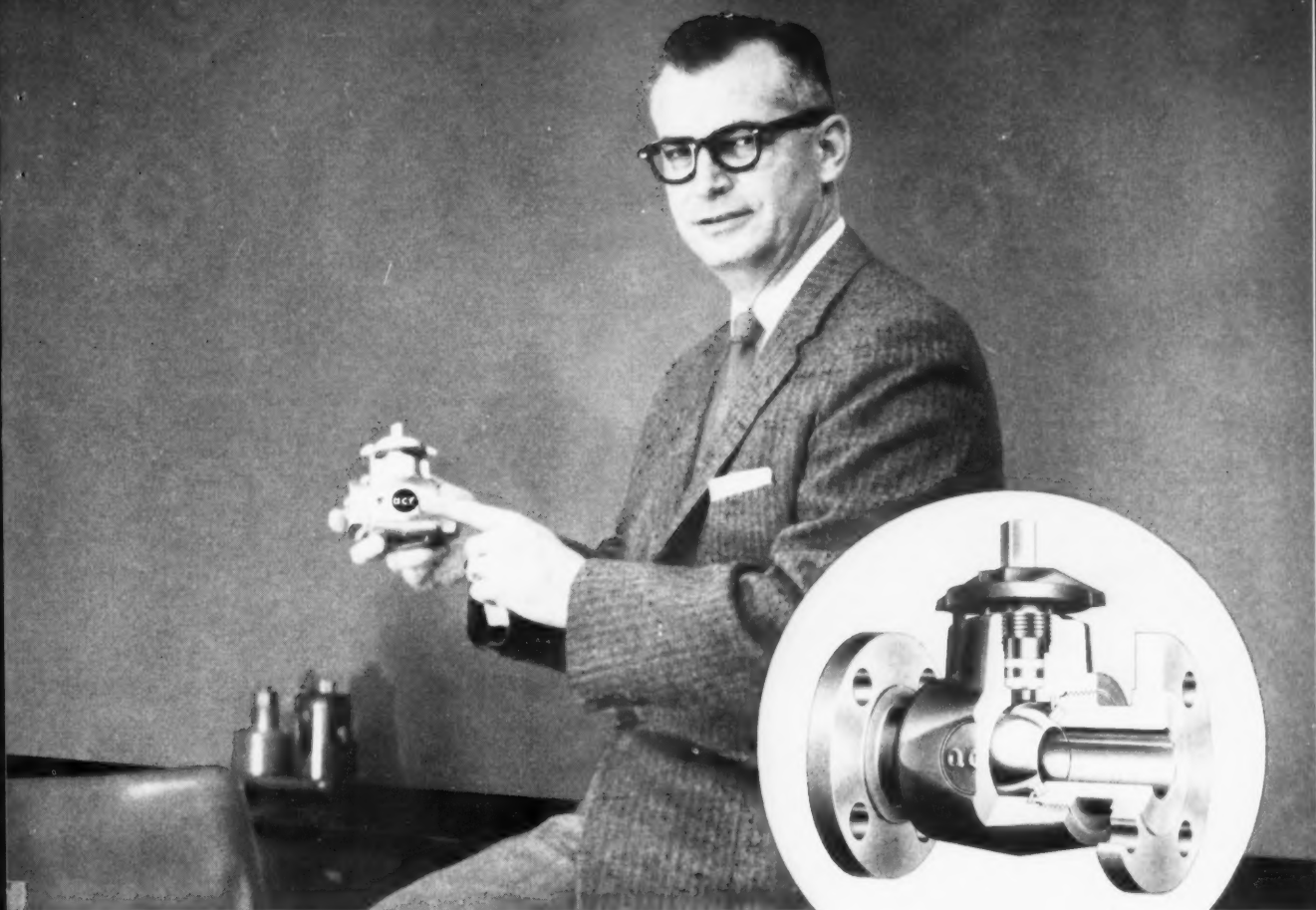
Consolidated Edison Plant Delayed

James F. Fairman, senior vice president of Consolidated Edison Company of N. Y., told the Congressional Joint Committee on Atomic Energy that completion of his firm's Indian Point nuclear power plant will be delayed for nearly a year because of unforeseen technical problems. The plant is expected to cost \$100 million — nearly double the original estimate made in 1955. The increased cost is attributed to many technical difficulties, such as the necessity for a change in nuclear fuel design after the project began, to some extent a general rise in prices, and to lack of information in 1955 to support a reliable cost estimate.

The Indian Point nuclear power plant was undertaken by Consolidated Edison with virtually no financial support from the government. The turn of events is cited as a prime example of the financial hazards facing private industry in the development and construction of nuclear power plants. Certainly Consolidated Edison's experience is a strong deterrent to private financial speculation in nuclear power plants. However, complete financing by the government also has drawbacks. A more sensible approach would appear to be a joining of the profit incentive of private industry with the government's desire to accelerate the development of economic nuclear power, through subsidies.

Need for Nuclear Power not Urgent

The joint committee also heard Philip Sporn, head of American Electric Power Company and an important exponent of nuclear power, warn against



You should know more about the new QCF non-lubricated Ball Valve

Now, while you're thinking about it, ask your secretary to have us send you Catalog 1000.

This catalog will give you a full description of the latest product of W-K-M's creative engineering—the ACF non-lubricated Ball Valve.

This new valve was service-tested for 3½ years before it was offered to buyers. Service-tested and service-proved: in the entire 3½ years, every user reported completely satisfactory results.

It's a great valve, this new one: versatile, rugged, efficient, easy to maintain on those rare occasions when maintenance becomes necessary, a valve you can specify with complete confidence.

So send for Catalog 1000—you should know more about this new valve.

Product of W-K-M's *Creative Engineering*

This cut-away picture shows you why this new valve performs so dependably, lasts so long, and is so economical to maintain.

Note the full, round conduit through body and ball that assures full flow through the valve—without turbulence, and with no more pressure drop than through an equivalent length of pipe.

Note the way the ball is suspended between Teflon seats under compression, assuring leakproof service at rated working pressures, or under vacuum, indefinitely.

Note the way actual seating surfaces are sealed away and protected from any abrasive action of the lading flow in either open or closed position.

Available in carbon steel (ASA 150 lb., 300 lb.), and semi-steel (200 lb., 400 lb.). Sizes range from ½" through 6". See Catalog 1000 for full listing of sizes and pressures.

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IN MODERNIZATION

GRACIOUS LIVING CALLS FOR THERMAL

When the Plaza Hotel in Houston planned to modernize its air conditioning system, Thermal multi-zone units were chosen to assure the year-around comfort of the Hotel's transient and permanent guests.

The Thermal line of quality equipment is famous for long life and efficient operation—which means it can be specified with confidence to deliver years of satisfaction. Thermal Engineering equipment includes central plant air conditioners, multi-zone air conditioners, cooling and heating coils, sprayed coil units, heating and ventilating units and air cooled condensers.

Detailed catalog available.

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Baxter Const. Co.	General Contractors
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hasty development of nuclear power. Sporn said that there is no "urgent necessity" in developing nuclear power "in the same sense that many of us may feel, for example, an urgent need to assure the elimination of any lag in the field of guided missiles." He also revealed his personal reservations about new objectives for achieving competitive nuclear power in some regions of the U.S. within 10 years and in foreign countries in an even shorter period.

One can indeed agree with Mr. Sporn if the foreign policy aspects of nuclear power are removed from the picture. There has been entirely too much emphasis in this country on almost frantic programs to make nuclear power economically competitive with power from conventional fuels. We seem determined to make a novel method economic simply because of the novelty. Little attention is given to the fact that any eventual savings easily could be erased by the tremendous cost of development. To a large extent we have been carried away by scientific achievement to the point where we have lost our senses as to economic feasibility. We have forgotten that every scientific achievement does not necessarily represent an opportunity for immediate economic exploitation. The only justification for nuclear power in this country must be economic advantage. With our supplies of fossil fuels we can afford to wait and adopt a more rational approach to development programs.

U.S. Lead, International Prestige

It is only fair to mention that one of the original economic motives for the development of nuclear power was to maintain a lead in the world market for nuclear power plants. Much of this lead was lost in the first place by foolish restrictions on the sale of reactors by American manufacturers to foreign buyers. At the first Geneva conference the British were taking firm orders while our companies could only display their wares and hope for a change in regulations. Lower labor costs in other countries have wiped out any residual lead we had, so the original motive is no longer present to any measurable extent.

Another of the original motives was the desire to maintain the international prestige of nuclear technology leadership. As far as power is concerned this leadership was forfeited long ago when the world's first nuclear power stations went into operation in England and Russia. At present it appears that the French and English are ahead of us in fuel technology and reactor technology. Right now it seems we are more successful at giving reactors away than at selling them—except where we provided the funds in the first place. ▲▲

For an
Ideal
Combination

of Quality
and
Economy...

go modern with Sylvania's new Fixture Series...

THE TARTAN



If you have an interest in quality lighting fixtures that feature attractive appearance, efficiency, and versatility, you'll want to know more about Sylvania's new Tartan Series.

This fresh new fixture series offers appealing design and shallower depth for neat, streamlined appearance... a wide selection of matching units in 2-lamp and 4-lamp widths in both 4' and 8' lengths... and the availability of either metal or plastic side panels in any unit. With the Tartan Series you also have a choice of metal louvers

with three different cutoffs to tailor the fixtures to the application.

Designed primarily for suspension mounting, the Tartan can be obtained for use with high output and very high output lamps in addition to standard fluorescents.

All of these features plus the moderate cost of this up-to-date fixture series now put attractive quality lighting within the reach of everyone planning a lighting installation, whether large or small.

The versatility and high efficiency of the Tartan Series make it the ideal means of lighting for many schools, offices, stores, and other commercial applications as well as for industrial uses where quality lighting is desired.

See for yourself how the Tartan Series can fit your lighting plans. Write for complete information today to:

Have you kept up to date with the broad range of fluorescent lighting systems and fixtures offered by Sylvania? If not, send for a complete fixture catalog today. A brief glance at the large variety of types and styles of Sylvania lighting equipment will show you why we say—

"Go Modern with Lighting by Sylvania."

SYLVANIA LIGHTING PRODUCTS

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FLUORESCENT LIGHTING FIXTURES AND SYSTEMS • BEST FIXTURE VALUE IN EVERY PRICE RANGE



Architect: GRAHAM, ANDERSON, PROBST & WHITE, Chicago, Illinois
Electrical Contractor: HYRE ELECTRIC CO., Chicago, Illinois

Electrical Protection goes MODERN with BUSS fuses! ... in the MORTON SALT BUILDING Chicago, Ill.

The beautiful, new Morton Salt Building is located at 110 North Wacker Drive in Chicago — just outside the Loop.

The safest and most dependable electrical protection was needed because the engineers estimated the available fault current might easily reach a value of 75,000 amperes.

For this reason, the main switchgear, consisting of 1-4000 ampere, 1-2000 ampere and 1-1200 ampere pressure switch, is completely equipped with BUSS Hi-Cap fuses.

To make available the same safe, dependable and trouble-free protection, all distribution panels are equipped with FUSETRON dual-element fuses.

THERE IS A BUSS OR FUSETRON FUSE FOR EVERY ELECTRICAL NEED



ONLY FUSES OFFER THE SAFETY AND DEPENDABILITY REQUIRED FOR TODAY'S CIRCUITS

Because of the ever-increasing transformer and network capacities, Power Companies now consider quite possible fault currents of 75,000 to 200,000 ampere.

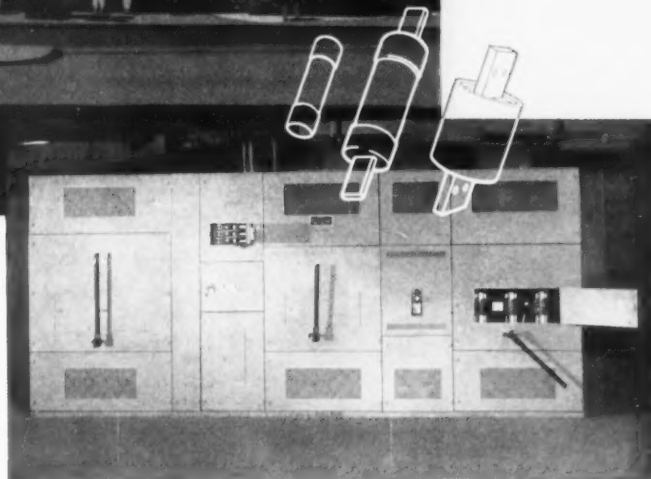
So too, the requirements for protective devices have been changed to assure safe interruption of these higher fault currents.

Fuses, — because of their high interrupting capacity and dependability — prove superior in meeting modern protection requirements.

With Fuses, Safe Protection Remains Safe

Dust, fumes, corrosion or age cannot increase a fuse's capacity or lengthen its blowing time. The operation of a fuse is not dependent on latches, triggers or other devices that are subject to the strains and jars of mechanical action — both in opening and closing.

A fuse cannot stick or fail to operate when electrical trouble occurs. 1 year, 5 years or 20 years from now, a fuse will provide the same, high degree of protection as on the day it was installed.



*Morton Salt Building: Mains and Feeders
protected by BUSS Hi-Cap and FUSETRON Fuses*

*On installations of
0 to 600 amperes . . .*

By installing FUSETRON dual-element FUSES—YOU GET 10 POINT PROTECTION

With rare exceptions, other types of protective devices protect only against short-circuits —

BUT, FUSETRON dual-element fuses give you safe, trouble-free 10 point protection.

For the FUSETRON fuse story ask for Bulletin FIS.

*For Loads above
600 amperes . . .*

BUSS Hi-Cap Fuses offer Safest, Most Modern Protection

They have an interrupting capacity sufficient to handle any fault current regardless of system growth — and by coordinating them with FUSETRON fuses on feeder and branch circuits, outages caused by fault currents can be limited to circuit of origin.

For the BUSS Hi-Cap fuse story ask for Bulletin HCS.

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CITY OF MIAMI SEWAGE TREATMENT PLANT

Design Engineers
Miami Sewer Project Associates; joint venture of
RADER ENGINEERING COMPANY
METCALF & EDDY
MAURICE H. CONNELL & ASSOCIATES, INC.

Supervising Engineers
METCALF & EDDY

Contractor
PAUL SMITH CONSTRUCTION CO.

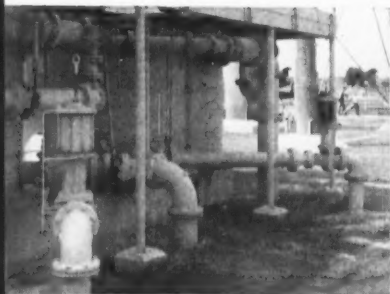


Aerial view of Miami's \$27,100,000 collection and treatment facilities shows extensive layout required to rid Biscayne Bay and the Miami River of pollution.

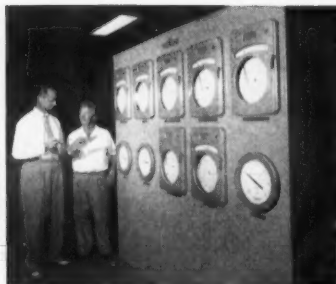


Modern design and layout contribute to the high efficiency of this multi-million dollar plant.

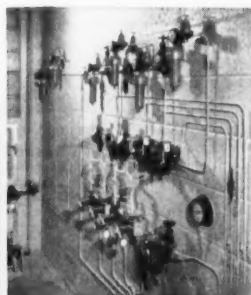
ONE SOURCE ONE RESPONSIBILITY



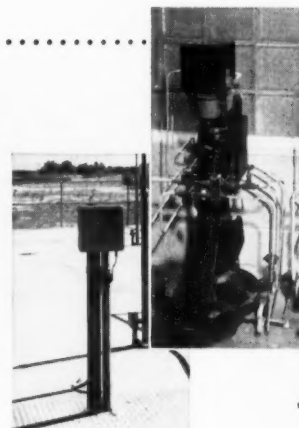
Builders self-actuated Rate-of-Flow Controllers at Effluent Water Treatment Plant assure accurate regulation of flows, filter efficiency . . . conserve head.



B-I-F standard main recording panel which centralizes essential operating data from remote stations.



Builders custom hydro-pneumatic accessories provide positive valve control and are capable of manual operation on loss of air.



Flow rate through Parshall Flume is transmitted pneumatically to several indicators and recorders installed at strategic operating points.

For New 47,000,000 GPD Treatment Plant...

SINGLE, RESPONSIBLE SOURCE

FURNISHES COMPLETE INSTRUMENTATION,

CONTROL AND CHEMICAL FEEDING EQUIPMENT

 *Builders-Providence* equipment plays vital role in maintaining Miami's high rate activated sludge type installation at peak efficiency.

Miami's new sewage treatment plant covers a 65 acre site on Virginia Key. A fully integrated control system is needed to centralize the operation of the many functions involved in such a widespread installation.

When this equipment is supplied by a single responsible source, the coordination of efforts during the planning, installation and start-up stages results in immediate and long term savings both in time and money.

Miami, like so many other municipalities, is benefiting from B-I-F's ONE SOURCE — ONE RESPONSIBILITY. For greater system reliability and operating economies, write . . .

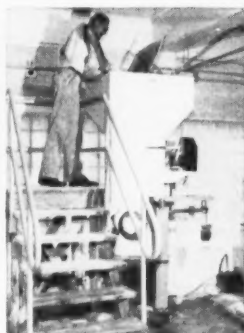
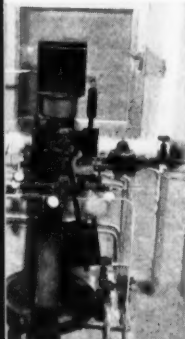
B-I-F Industries, Inc., Utilities Sales, 512 Harris Avenue, Providence 1, R. I.



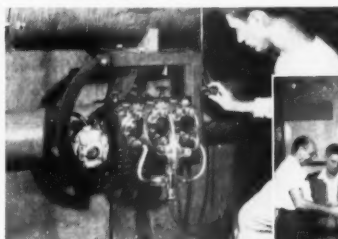
B-I-F INDUSTRIES

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

Modern rate-of-flow pendulum-operated diaphragm units provide continuous, dependable flow regulation over 24 to 1 range.



Omega Universal Dry Feeder accurately proportions lime to flow rate of effluent water treatment . . . conserving chemicals and insuring correct dosage despite output variations.



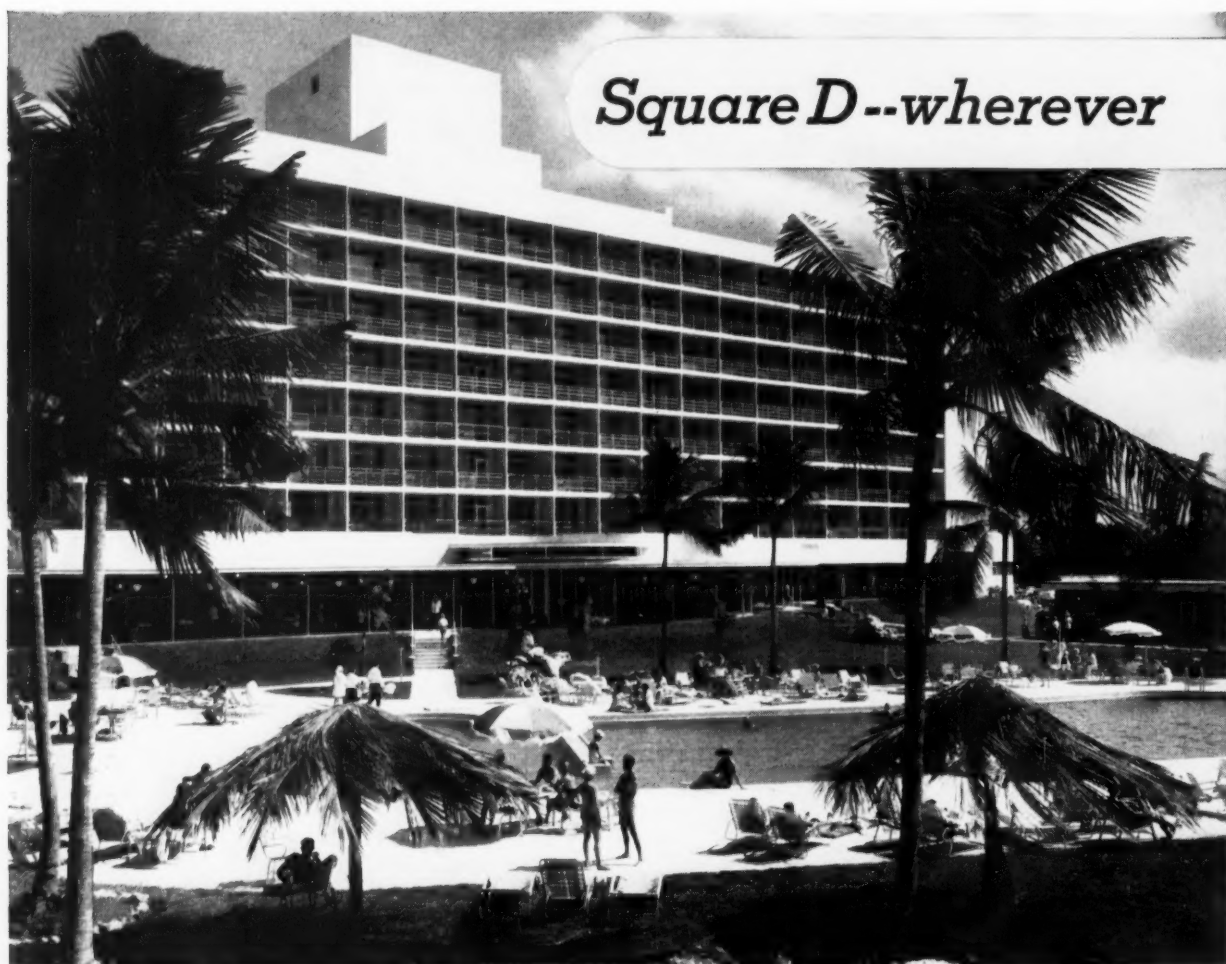
In pipe gallery, operator uses Proportioners Chem-O-Feeder to add correct dosage of foam control chemicals . . . reliable equipment on standby duty!



Another B-I-F standard panel records aeration air, air temperature (wet and dry bulb), digester gas burned by engines, and indicates air to sewage ratio. Wall-mounted summator at right gives accurate and continuous summations of air output of four blowers.



Builders Conveyoflo meter accurately totalizes as well as indicates hourly rate of filtered sludge discharged to incinerator. B-I-F supplies a complete line of equipment (meters, feeders, controls) for positive control of materials in motion.



EL SAN JUAN INTERCONTINENTAL*

• Here is one of the Caribbean's most beautiful tourist and resort hotels. Built at a cost of \$7,500,000 and operated by Intercontinental Hotels, New York, it stands on a 16-acre ocean-front tract between the center of San Juan and the International Airport. Each of the hotel's guest rooms has an individual balcony overlooking the beach and ocean. Within the completely air-conditioned hotel are restaurants and the *Tropicoro* night club and casino, the latter created by Max Borges, Jr., designer of Havana's famed

Tropicana. The hotel's convention hall and ballroom, with a floor area of 12,000 square feet, can accommodate 1500 people. *Square D* equipment distributes and controls the electricity throughout this beautiful structure.

FIELD ENGINEERING SERVICE is available to architects and consulting engineers through more than 100 *Square D* offices, backed by 1000 authorized electrical distributors and 19 plants in the United States, Canada, Mexico and Great Britain.

Executive Offices • 6060 Rivard Street, Detroit 11, Michigan

*Designed by ROY F. FRANCE & SON, Miami Beach, Florida, and G. FERNOS LOPEZ, Consulting Architect, San Juan, P. R.
Design Engineers • SASNETT ENGINEERING, INC., Miami, Florida
Electrical Contractor • COMMONWEALTH ELECTRICAL CONSTRUCTION, INC., San Juan, P. R.

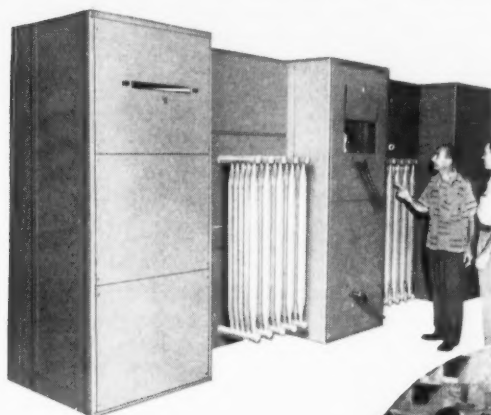


SQUARE D COMPANY

electricity is distributed and controlled



This **SQUARE D CONTROL CENTER** centralizes all motor control for units which air-condition the lobby, foyer entrances, offices, dining rooms, cocktail lounge, night club and casino. Pumps for chilled water system and swimming pool are also controlled from this center. **SQUARE D** totally enclosed **FEED-IN DUCT** brings power from substation.



Two **SQUARE D SUBSTATIONS** (one shown at left) separately feed power and lighting and small appliance loads for the entire hotel. **SQUARE D ALUMINUM FEED-IN DUCT** distributes the hotel's electrical power. Two vertical risers feed all eight floors.

Sager Colman, Square D Export Manager, discussing electrical equipment installations with Harley Watson, General Manager of El San Juan Intercontinental Hotel, during early construction stage.



A *Complete* LINE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

ADJUSTABLE SPEED DRIVES
BUSWAYS & WIREWAYS
CIRCUIT BREAKERS
CONTROL CENTERS
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LIGHTING AND POWER PANELBOARDS
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STAGE DIMMERBOARDS
STEEL MILL CONTROL
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TIMERS
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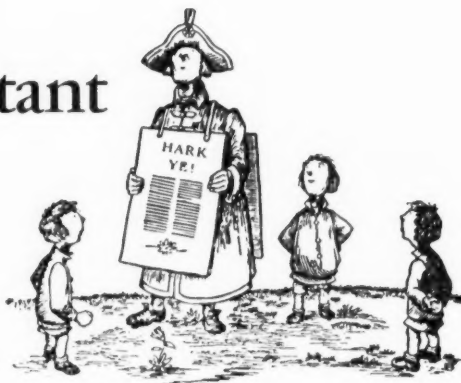


News for the Consultant

Solar, Wind, and Geothermal Power

A two-year United Nations study of new energy sources indicates that significant progress is being made in world-wide development of solar, wind, and geothermal energy. The direct conversion of solar energy to electricity by solar batteries and thermoelectric converters is moving swiftly, and solar energy also is being studied for steam production, refrigeration, and water distillation. The report points out that applications in solar heat storage, solar engines, and solar furnaces for industry are in less advanced stages of development.

The Russians have developed a 25-kw wind driven power unit that supplies electricity to villages and collective farms, and recently a number of similar small modern wind power plants have been installed in underdeveloped countries. In



Europe, there are studies to link wind power plants to local and national grid systems. While the design of wind-driven generators differs from country to country, the UN study shows that most employ conventional propeller type machines driving a generator through gearing and use the minimum height tower necessary to provide ground clearance.

Production of electric power from natural pools of either steam or hot water until recently was largely limited to Italy. New Zealand and Russia now are making limited use of geothermal power, and New Zealand eventually will have a geothermal complex of 300,000-kw capacity. Geothermic fields have been discovered in France, Burma, Kenya, El Salvador, and southern California. Mexico's large geothermal fields are also under active development. And Iceland, which has been using geothermal energy for space heating, now is producing salt for its fishing industry from geothermal-powered sea water distillers.

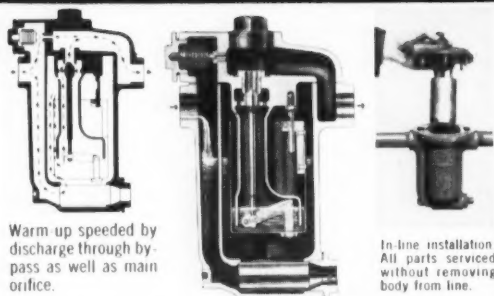
Automated Aerial Photogrammetry

A new instrument called Stereomat, representing a fundamental break-through in the science of aerial photogrammetry, automatically draws contour lines showing ground elevations on maps made from aerial photographs.

The development offers enormous potential for civil and military mapmakers and in mining, heavy construction, and industries requiring fast, accurate mapping service. The device will speed production of contour lines at least five times, according to its developers, engineers of Hunting Associates Limited, Toronto, Canada.

The Stereomat is basically an automatic scanning correlator that can be mounted on conventional projection type plotters in place of manually operated stereoplotters. A cathode ray tube replaces the ordinary platen. Vertical movement of the tube and leveling adjustments for the projectors are

Now—A Steam Trap that Adjusts Automatically to Every Operating Condition!



AUTOMATICALLY REGULATES FOR FASTER WARM-UP AND TO KEEP OPERATING TEMPERATURE AT PEAK HEAT

Proven bucket design with built-in accessories. By-pass thermostatic increases discharge for warm-up and overload conditions. Thermostat compensated to operate at 10° below saturated steam temp. Wright Austin Airxpel principle provides for mechanical discharge of air after Thermostatic by-pass has closed.

WRITE FOR BULLETIN 808

WRIGHT-AUSTIN COMPANY
3245 WIGHT STREET • DETROIT 7, MICH.

From full speed to 50% reduction...

*draft keeps pace
with boiler needs*



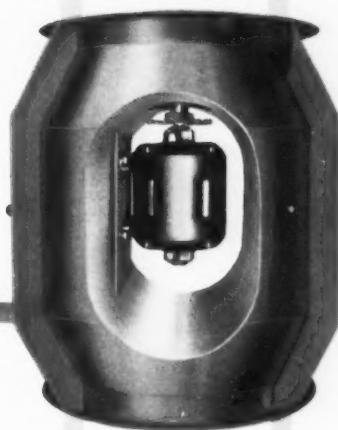
11-step controller for
single-phase motors.
9-step model for 3-phase
motors also available.

Located anywhere in the boiler room, motor speed controllers for DeBothezat Induced Draft Bifurcator® Fans permit *complete draft flexibility*.

As draft requirements vary during starting and fluctuating loads, fan speed can be adjusted for optimum boiler performance.

DEPENDABLE . . . COMPACT Direct motor drive eliminates belts. Motor is completely isolated from fumes and heat. This results in such dependable performance, these DeBothezat units are widely used in unattended radio-TV relay towers and pipeline stations.

DeBothezat Induced Draft Bifurcators are available for high pressure boilers delivering up to 60,000 pounds of steam per hour and low pressure boilers delivering up to 190,000 EDR.



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... or in stack outside.

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SWEET'S
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De BothezatTM FANS

A DIVISION OF

American Machine and Metals, Inc.

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IN CANADA: Represented by DOUGLAS ENGINEERING CO., LTD., Toronto • Montreal

controlled by servo motors. Stereomat traces contour lines by means of a system of interrelated electronic, optical, and mechanical equipment.

Benson-Lehner Corporation of Los Angeles has been licensed to manufacture and sell Stereomat in this country.

San Diego County Hospital

Freeland, Evenson, Christensen & Boas, civil engineers; Paderewski, Mitchell, Dean and Associates; and Wulff and Fifield, architects, a joint venture, all of San Diego, are designing the new \$10-million San Diego County Hospital. Other engineering services will be performed by Willis Lipscomb, San Diego, electrical; Ralph E. Phillips, Inc., Los Angeles, mechanical; and John Ruskin, also of San Diego, structural.

Plastic Arch

An interesting new type of building has been erected in Stephenville, Texas to serve as headquarters for its designer and manufacturer, Structural Plastics, Inc. The 7500-sq ft structure is in the form of a trussed arch, spanning 78 feet, and composed of 617 precast and prestressed 4-ft hyperbolic paraboloids of fiberglass reinforced plastic. The arch was completely built on the ground and erected quickly without use of scaffolds. It has



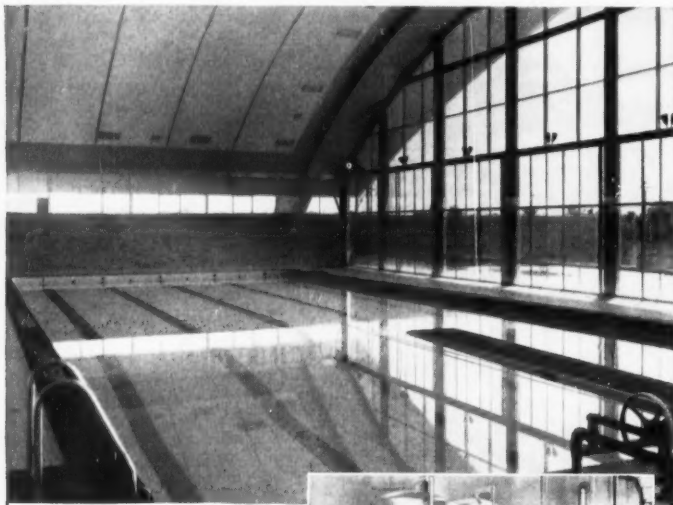
This view of the nearly completed arch shows far side raised for installation of a row of plastic units.

been tested to an equivalent of 20 pounds per square foot live load.

The hyperbolic paraboloid units themselves are produced in two models: with two adjacent sides perpendicular, and with no two adjacent sides perpendicular and no sides parallel. Colors can be molded right into the plastic units; the panels need no repainting and, according to the manufacturer, require little maintenance.

Modern Roman Sports Arenas

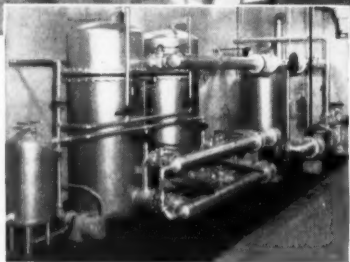
The city of Rome will host the XVII Olympic Games this August in two new domed sports arenas blending modern prestressed concrete techniques



Shown above is the beautiful Derby Junior High School (indoor-outdoor) Pool, Birmingham, Michigan which uses an Adams I SPF-169 filter to handle the 108,000 gallons capacity. Eberle M. Smith Associates, Inc., Detroit, Michigan was the Architectural Engineer.

Adams SPF swimming pool filters are available in sizes from 55 to more than 1000 square feet of filter area. Normally all sizes can be shipped from stock. A typical unit is shown at the right.

Sorry...but we do not offer filters for your client's backyard pool.



when you specify

ADAMS SWIMMING POOL FILTERS

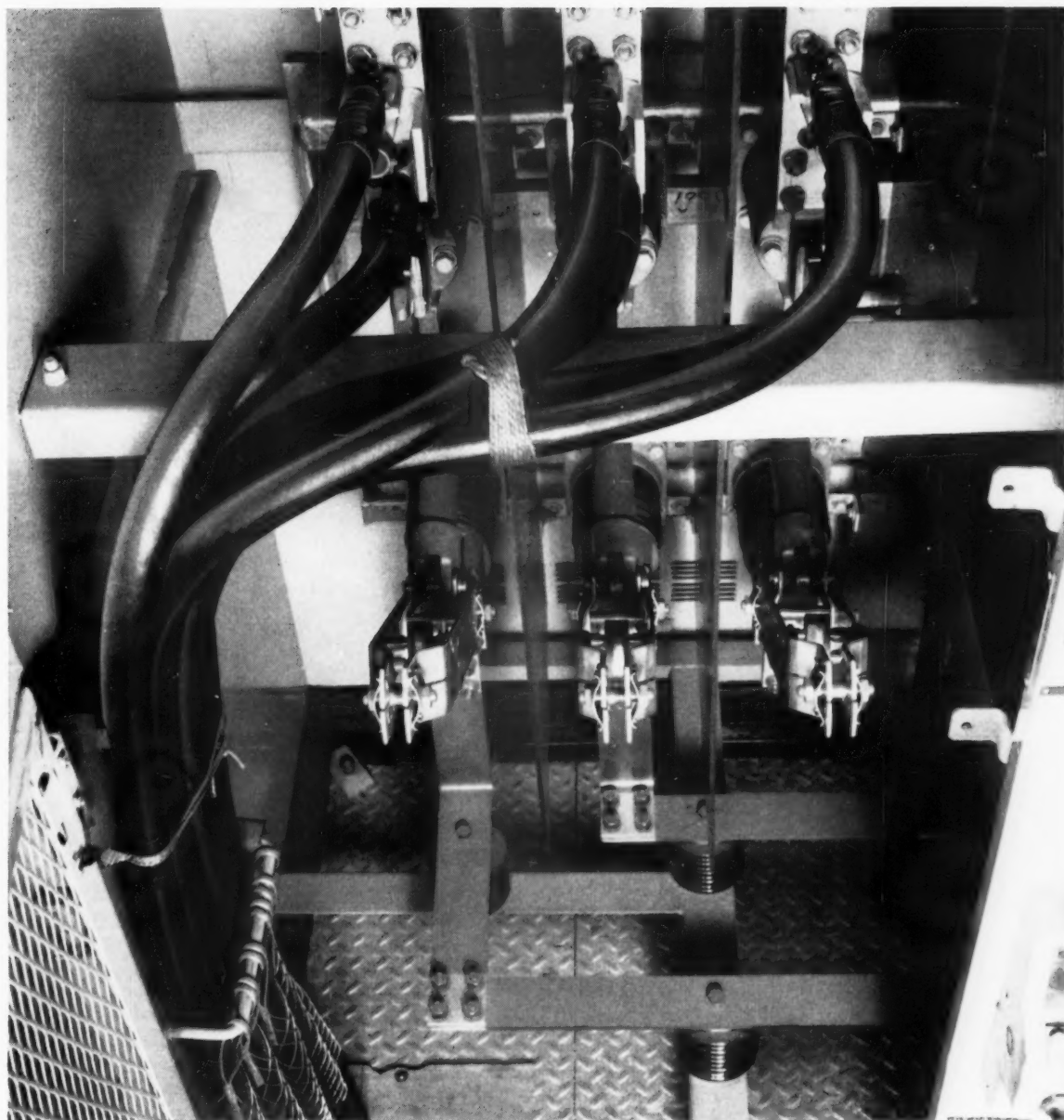
**you enhance your professional
standing**

Your professional reputation is your most important asset. Will a happy client today be happy five years from now? When you specify the proven, trouble-free and yet competitively priced Adams filter for your commercial, municipal or institutional client, you can be sure of the integrity of your reputation in the years to come.

That's because ours is a quality product. All inner surfaces are sand blasted and have three coats of vinyl lining...tube support rods and nuts are stainless steel...closure plates and clips are galvanized forged steel...our Poro-Stone media is inert to chemical corrosion and electrolytic action of chlorinated water.

Complete details are furnished in our new technical Bulletin 626. This bulletin was prepared with you specifically in mind. Why not write today...on your letterhead, please...and we will send it to you promptly? Your client deserves the best you can specify.

R. P. ADAMS CO., Inc. 256 East Park Drive, Buffalo 17, N.Y.



FOR EFFICIENCY AND LONG LIFE *Specify Kerite Cable*

This 5KV unshielded cable used for power auxiliary service in an important new central station is typical of Kerite engineering to provide reliable installations in restricted space at minimum cost. Plant engineers can "have their cake and eat it too." Hundreds of these

Kerite non-shielded installations have been operating over the last 18 years without troubles or interruptions.

The reputation of Kerite insulation for long-lived resistance to the elements should make it the first choice of the power plant engineers.

KERITE CABLE



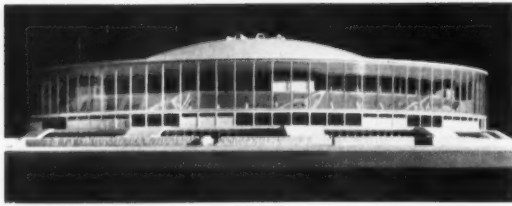
...it's the KERITE that makes the difference

Our headquarters is at 30 Church St., New York 7.

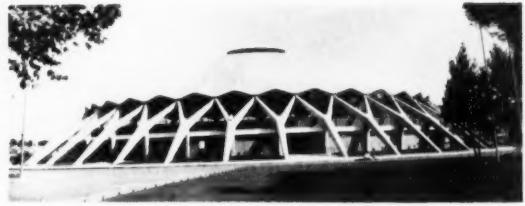
BRANCHES IN

Ardmore, Pa., Boston, Cleveland,
Chicago, Houston,
San Francisco, Glendale, Cal.





Thin shell dome rising from center of \$1,280,000 Palazzo dello Sport is 400-ft wide, 107-ft high.



Extensive use was made of precast and prestressed concrete in Nervi-designed Palazzetto dello Sport.

with the engineering and architectural traditions of the past. One, the Palazzo dello Sport, will house 30,000 people; the smaller Palazzetto dello Sport seats 5000 spectators.

The vast circular Palazzo with its 107-ft high concrete dome covers an area of 124,000 square feet. It contains provisions for the major field and track events and swimming pools and gymnasiums. Liberal use of glass and plastic combined with prestressed concrete make it similar in appearance to the United States pavilion at last year's Brussels Worlds Fair. The Palazzetto, designed by famous Italian structural engineer Piero Nervi, also makes bold use of prestressed and precast concrete members. This structure is for the boxing and wrestling events. Its dome is built up of 1620 prefabricated

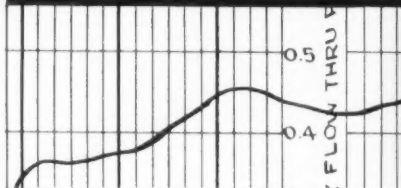
concrete sections. Italian designers consider the Palazzetto to be the ideal prototype for future medium size indoor stadiums.

Street and Highway Lighting

The prediction that many cities in this country could cut in half their after-dark traffic death toll by installing modern street lighting was made by a General Electric lighting engineer, John C. Boyter. He cited the example of Gary, Indiana's relighting program and the city's subsequent 53 percent reduction in nighttime traffic fatalities, in spite of a 27 percent rise in population and a 68 percent increase in vehicle registrations.

Boyter pointed out that the incidence of auto accidents at night are three times as great as

NOW LOW-COST AUTOMATIC FLOW RECORDING



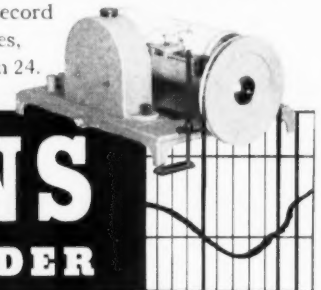
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124 pages of technical data on recorder installations, plus a wealth of hydraulic tables and conversion tables. \$1 copy. (No COD's)

Directly Readable Flow Charts

Obtain graphic records of liquid flow directly readable in million gallons per day or gallons per minute over various sizes of Parshall flumes. The same recorder can also be used with charts reading in feet and hundredths to record head or surface fluctuations in lakes, streams, wells. Write for free Bulletin 24.



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The planning and efficient operation

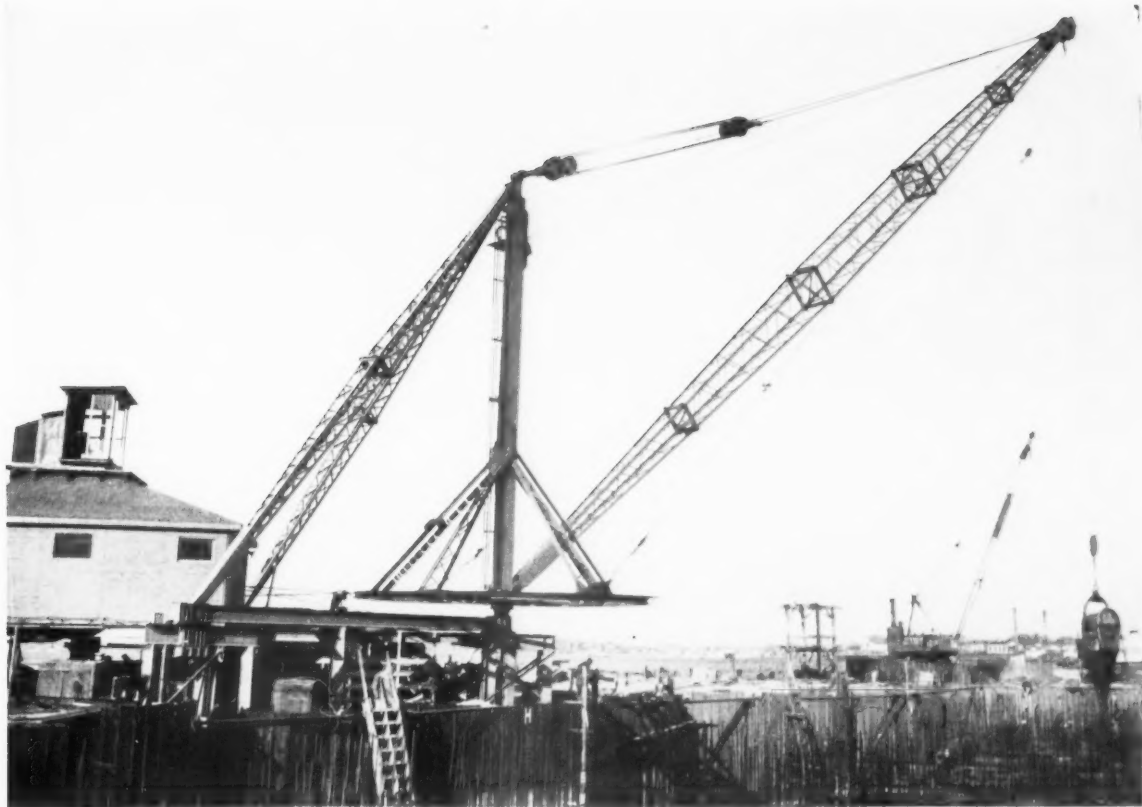
of any project which involves measurements of flowing liquids is based on flow data which can be obtained with STEVENS Recorders. These instruments are at work compiling data on hydroelectric and flood control projects and in water works, sewage disposal plants, irrigation and industrial installations in all parts of the world.

Experienced technical staff available to supply product information for liquid measurement installations. Write, giving description of project and scope of data desired.

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specialists in hydrologic instruments for over half a century





CLYDES MAKE BIG POUR AT THROGS NECK

On the Queens anchorage of the multi-million dollar Throgs Neck Bridge, New York City, a joint venture of J. Rich Steers, Inc. and Frederick Snare Corp., a Clyde hoist and derrick team up to place most of the concrete in the huge caisson.

The Clyde derrick positioned on the wall of the coffer-dam, has a 150 foot boom that enables it to cover almost the entire area of the 146 x 226 foot box.

A 21,000 pound line pull three drum Clyde hoist and an independent swinger provide ample power to handle the concrete bucket smoothly, rapidly and with complete safety.

The nation's leading contractors rely upon the unmatched value of Clyde equipment to keep materials moving on jobs that demand tight building schedules. Whether you have little yard-

age or a big pour; and occasional lift or a high speed rehandling program, it pays to take advantage of Clyde equipment.

It takes a lot of features to add up to a superior quality, work-hungry hoist and Clyde has all of them. All steel bed and side frames that provide exceptional ruggedness without excessive weight. Large diameter brakes and clutches that assure positive load control. Anti-friction bearings throughout for less maintenance and power consumption . . . these are but a few of the many advanced engineering details that have contributed to make Clyde hoists the very finest in the field for over 60 years. Clyde products are available in a wide range of sizes, styles and capacities to suit your particular material handling needs.

Write now, for a new Bulletin 34A that tells you why Quality is Always Foremost in Clyde Hoists.



CLYDE IRON WORKS, Inc.

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HOISTS : DERRICKS : WHIRLEYS : BUILDERS TOWERS
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during the day, and that the pair of 150-watt headlights of modern cars cannot be expected to replace sunshine. Good highway lighting, he said, averages less than one percent of the cost of a new highway, and costs less to maintain than mowing roadside grass and policing trash.

Long Range Tracking Antenna

An 85-ft diameter antenna, specifically designed for tracking and communicating with this nation's space vehicles—and ultimately capable of a range of 4000 million miles—is being operated by the U. S. Army near Goldstone Dry Lake, California. The remote desert site was selected because the highly sensitive tracking instrumentation necessitated elimination of as many external signals as possible, such as those from radio and TV transmitters.

The unit is similar to radio telescopes used to locate and track stars. The antenna is equatorially mounted and equipped with hydraulic drive permitting coverage of all areas of the sky above the horizon, except for a small area restricted by the support structure.

In receiving radio signals from a space probe, the antenna's parabolic reflecting surface focuses radio waves at a point where a pickup antenna is located. This focal point is supported by a tall quadripod attached to the 6000-sq ft reflector.



Mammoth space vehicle tracking antenna is 110-ft high, has potential range of 4000-million miles.

The signal then is transmitted to a highly sensitive receiver which stores the data on tape for future data reduction.

The present range of the instrument is limited to 400,000 miles from the earth because of existing inefficiencies of the receiver itself and limited power of present space vehicle radio transmitters.

First Fully Automated Central Station

Little Gypsy Station, a 225,000-kw gas-fired facility near New Orleans, will be the world's first completely automated steam plant. Every phase of the plant's operation—start-up, on-the-line operation, and shutdown—will be monitored and controlled by a digital computer system especially designed and built for the job. The computer manufacturer guarantees 99 percent availability of the system, which consists of 11,000 solid-state transistors and diodes. Use of electron tubes was avoided in the design of the computer.

The normal complement of human operators for a plant of this size will be on hand, both for maintenance functions as well as to take over plant operation in event of computer malfunction.

The computer will start up the plant in 4½ hours compared to at least 6 hours required with conventional manual control. When the computer puts the plant on the line, it reprograms itself for the

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DEPENDABLE**

**CONTACTORS IN
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For:



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All parts are accessible—readily inspected, easily replaced. Full floating armature permits perfect magnetic seating, silences AC hum.

Contacts are copper to copper. Heavy compression springs assure contact pressure, quick opening. Coil will not overheat in 24-hr. continuous service.

Zenith contactors are made for severe duty. Capacities to 600 amps.

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The dramatic facade of this new Cleveland office-warehouse of E. R. Squibb & Sons, Division of Olin Mathieson Chemical Corporation, consists of 4' x 8' panels of translucent ivory PLEXIGLAS. Fluorescent tubes behind the panels provide complete luminosity at night. Letters and trademark reproductions are also PLEXIGLAS. Architects: Toombs-Amisano & Wells, Atlanta, Ga. Builder: Gillmore-Olsen Co., Cleveland.

Beautify and Identify with **Plexiglas**

The luminous facade shown above is just one of the many ways PLEXIGLAS® acrylic plastic is being used in building applications. Others are dome skylights, lighting diffusers and lenses, signs, daylight-control panels, spandrels, partitions, and decorative glazing. The reason for this variety of uses? PLEXIGLAS combines light transmission with wide color range, outdoor stability, light weight, resistance to breakage, and ability to be formed to almost any shape. Write for the names of building products made of PLEXIGLAS, and for technical information and assistance on your specific projects.



Chemicals for Industry

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operational mode. It runs the plant by operating major control loops: combustion control, steam temperature control, feedwater control, and spray control (overriding steam temperature control—as a safety feature). Shutdown is immediate, the plant going off the line at the push of a button.

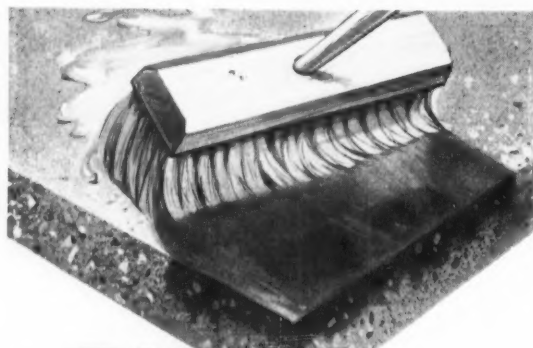
Designed into the installation is a fuel safety and purge system. Upon indication of an explosive mixture in the boiler, the gas supply is immediately cut off, the boiler purged with air, and plant shutdown procedures are automatically initiated.

Once an hour the computer evaluates component and over-all efficiencies throughout the system. All data, including the measurement of pressures, temperatures, and flows at important points in the system, are automatically logged. A special display of plant efficiency also is provided by the computer, which compares the plant heat input with the plant electrical output.

Ebasco Services, Inc., did the complete engineering and design and are constructing the new plant for Louisiana Power & Light Company.

Pebble Bed Nuclear Reactor

Sanderson & Porter, New York engineers and constructors, have developed under AEC contract a new spherical fuel element for use in a gas cooled, high temperature "pebble bed" nuclear reactor.



the **EASIEST** way to make a concrete floor harder

Apply *Hornolith*—it gives unpainted concrete floors flint-like surfaces that resist dusting, abrasion and the deteriorating effects of moisture, chemicals and oils. *Hornolith's* powerful wetting agents actually reduce the concrete's surface tension, enabling *Hornolith* chemicals to penetrate and saturate. It complies with Federal Job Specification for magnesium and zinc fluosilicate floor hardeners. A chemical reaction binds the fine sand and cement particles into a tight mass. One gallon covers approximately 100 sq. ft.

For details on *Hornolith* and the complete line of Horn floor hardeners, write Dept. CE-46.



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Handball-size fuel elements are easy to make, yield high burnup, and provide simple reactor refueling.

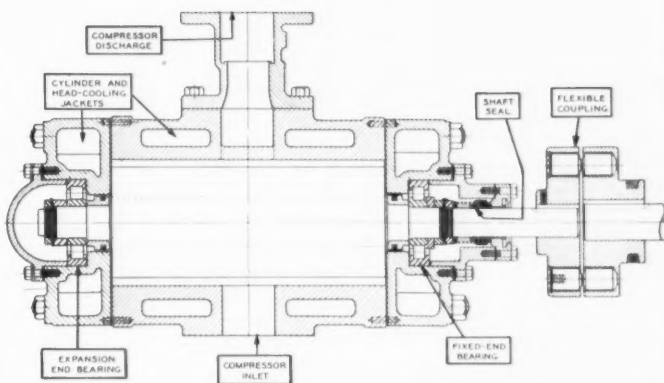
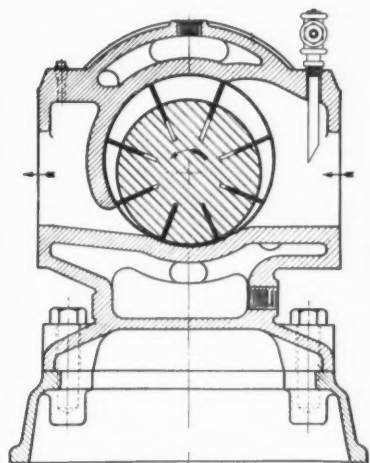
The fuel element, about the size of a handball, incorporates the graphite moderator with the fuel. The fuel itself is in the form of a ceramic, rather than as a metal, permitting very high operating temperatures in the reactor.

The pebble bed reactor system will be capable of operating at a sufficiently high temperature to produce steam for direct use in steam turbines, without the need for auxiliary superheat equipment. Other advantages includes simplicity of manufacture of the small balls, high burnup, cheap reprocessing, and simplicity of reactor loading—the fuel elements simply being poured into the reactor.

Prestressed Concrete Hangar at Gatwick

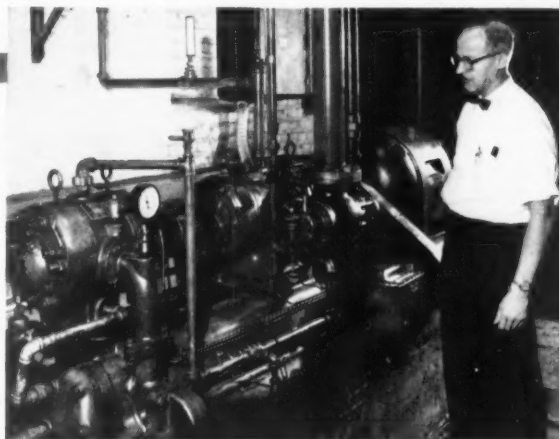
Gatwick Airport, near London, has an unusual new 282-ft long, 112-ft wide, 41-ft high hangar framed with 110-ft long triangular precast and prestressed trusses. The trusses, 8-ft 8-in. deep, were designed to eliminate purlins by splitting the top chord into parallel members spaced 3-ft 4-in. on centers. The horizontal loads exerted by the triangular web members are distributed by diagonal members in the plane of the roof. All frame members were assembled and prestressed on the ground; the frames are stressed together transversely by continuous cables in the roof.

At the hangar rear, U-section columns are tied together by precast edge beams forming gutters. A 10-ft deep main beam, formed by fitting additional concrete members between ends of the triangulated trusses, provides two 140-ft wide door



Hard service never affected this Fuller rotary's original output—230 cfm. of air at 90 lb. G., reports Mr. Schott, chief engineer, Thomas C. Wilson, Inc., Long Island City, N.Y.

FULLER ROTARY COMPRESSOR RUNS 13 YEARS WITHOUT DOWNTIME



A Fuller rotary at Thomas C. Wilson, Inc. got its first maintenance shutdown recently, for renewal of roller bearings and rotor vanes—after running without downtime since 1945.

4 years of 24-hour service. The Wilson plant makes tube cleaning equipment, tube expanders and portable pneumatic tools, and so makes heavy daily demands on shop air. For the first four years, three-shift operation kept the Fuller rotary running round the clock. Since 1949, it's been working eight-hour shifts.

Simple design means trouble-free service. Besides

bearings, the only moving parts in a Fuller vane-type rotary compressor are the cylindrical rotor and the blades. These compensate for wear automatically. Cylinder head slips off, permitting blade and bearing inspection in a matter of minutes.

Compact and vibration-free. Direct-drive system saves space. Simple, rugged design gives constant service without extensive supervision. Thus, Fuller rotaries can be installed out-of-the-way on upper floor, on balconies, in basement corners, using low-cost, light-weight foundations.

1189
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Write today for detailed information on the full line of Fuller rotary compressors for in-plant services, gas gathering, and industrial refrigeration.

For details on the Fuller product line, see Chemical Engineering Catalog



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118 Bridge St., Catasauqua, Pa.

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PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

openings at the front of the hangar. All supporting columns are prestressed to resist wind forces.

Consulting engineer Alan J. Harris, Senior Partner in the London firm of A. J. and D. J. Harris, specified standard products whenever possible and was able to reduce the cost of the structure to about half that of similar long-span buildings.

Harbor Subsidence

Long Beach, California is spending \$60 million to stop the subsidence of a 20-square mile section of its harbor, first discovered to be sinking in 1941. Unless the project is a success, the area's oil wells, currently producing 80,000 barrels a day, and the Navy's \$175-million shipyard will be under water.

Gradual settling in the area—now at a rate of a foot a year—has resulted from the unusual geologic makeup of the roof of the oil field. Only thin layers of shale, gravel, and sand support the overburden. To compensate for this, plans call for pumping sea water through a system of 259 wells and a maze of pipelines down 2000 to 6000 feet into layers in the ground where the oil has been removed. The injected water is not only expected to prevent further subsidence, but also will serve to repressure the oil field and increase oil recovery.

Presently there are 37 water wells injecting 200,000 barrels of sea water into a test field. To

completely stabilize the field and eliminate subsidence, the system will have to pump 1-million barrels of water a day.

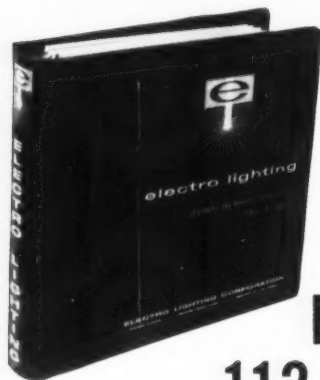
M. A. Nishkian & Co., Long Beach, is the consulting engineer for the project.

World Bank Loans to El Salvador

The World Bank has loaned the government of El Salvador \$8 million to build an all-weather highway network and to expand its electric power facilities. Of this total, \$5 million will be used to build 21 feeder roads to tie in with the 190-mile main highway now under construction. These roads will have a total length of 230 miles, and



Capacity of El Salvador's "5 de Noviembre" station, completed in 1954, will be increased to 60,000 kw.



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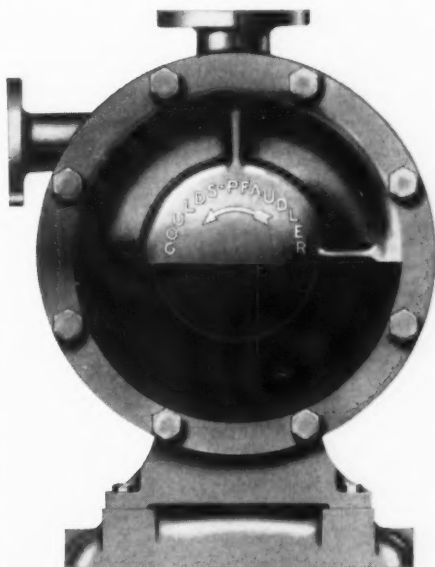
Electro Lighting Corporation

1535 South Paulina St. • Chicago 8, Ill.

many will replace existing dirt paths that become nearly impassable quagmire in the rainy season. The road network is opening up a rich area for settlement and agriculture and will improve communications in the southern half of the nation.

Although El Salvador is primarily an agricultural nation, industry is growing. Nearly 100 new industrial plants have sprung up and many existing industries have expanded. The \$3 million allocated for power expansion will add another 15,000-kw unit to the 45,000-kw "5 de Noviembre" hydro plant on the Rio Lempa. This plant produces three-quarters of the nation's power. A new 40-mile long

ACETIC ANHYDRIDE ALUMINUM SULPHATE BORIC ACID CARBON TETRACHLORIDE CUPRIC CHLORIDE ETHYL ACETATE FERRIC NITRATE FERROUS SULPHATE GLUTAMIC ACID IODIC ACID ETHANOL MONOCHLORIDE NOETHANOLAMINE PHOSPHORIC ACID PHENOL POTASSIUM PERMANGANATE PYROGALLIC ACID SODIUM SULPHATE SODIUM PHOSPHATE SODIUM HYDROXIDE SODIUM CHLORIDE SODIUM CARBONATE SODIUM HYPOPHOSPHATE SODIUM CHLORITE



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Every surface that comes in contact with the pumpage is protected by glass fused to metal—in the Goulds-Pfaunder Fig. 3708 glassed centrifugal pump.

This pump can lick your corrosion or contamination problem when pumping corrosives like those listed here (and hundreds more). The tough glass-to-metal bond resists most acids at temperatures up to 350°F and alkalis at moderate temperatures. And, because glass is so smooth, it discourages product adhesion and scale build-up. No loss of product due to contamination, since glass is inert.

Choose from four different sizes and get capacities up to 700 GPM, heads up to 140 ft.

Write for Bulletin 725.2 for details, plus a second booklet, "It's What's Inside That Counts," for the inside story. Address Goulds Pumps, Inc., Dept. CNE-59, Seneca Falls, New York.

GOULDS & PUMPS

high-voltage transmission line also will be added, connecting San Salvador, the capital, to Santa Ana, the country's second largest city.

Flexible Warehouse

A 13,700-sq ft steel-frame warehouse that rides subsidence waves has been erected in Mansfield, Nottinghamshire, England, a locality exposed to subsidence due to extensive coal mining operations in that area for many years. Stability of the structure depends solely on a unique system of pre-compressed spring braces located in the gable ends and side walls. The precompression insures that no movement occurs in a brace until a load of two tons is applied, and sufficient braces are included to make sure that this load is not exceeded in any single brace at maximum wind velocity.

When subsidence occurs and the two-ton load is exceeded, movement takes place vertically through the columns which rest on 5-in. concrete slabs sitting atop 6 inches of consolidated sand bed. The slabs are designed to slide in the bed, eliminating any relative horizontal movement.

Steelwork members are pin-jointed, with the walls being formed of overlapping precast concrete units hanging from lugs welded to box columns. The roof is built up of 10-ft x 10-ft timber panels bolted to the trusses to form a rigid dia-



English warehouse designed to ride subsidence waves.

phragm that acts as a horizontal beam to transfer wind loads to gable ends.

The warehouse is constructed on slightly sloping ground, and rests on half cut and half fill, the fill being consolidated to about the same density as the cut to avoid any permanent differential settlement. The designers estimated that changes in level due to subsidence over the entire building is not likely to exceed 4 inches.

Prefabricated Road Slabs

Roadbuilders in Stuttgart, Germany are speeding repair of old highways by means of factory prefabricated sections. Concrete slabs 8-in. thick and 5-yards square are cast in the factory and transported to the previously prepared road site. The huge sections then are placed in position over a layer of gravel and bitumen and covered with an asphalt top surface. This construction technique has been found to be faster by four to five weeks compared to previously poured in place construction.

Missile Research Station on Wallops Island

Wallops Island—a thin finger of land 8-miles long and 1200-ft wide, two miles off the coast of Virginia—will become a prime research center for the National Aeronautics and Space Administration. One of the first major design contracts in the vast expansion program at Wallops has been awarded to Daniel Mann Johnson & Mendenhall, Architects and Engineers of Los Angeles.

DMJM is designing two launching pads to be used for both solid and liquid fueled rocket space probes, a control blockhouse, and a test stand for static testing of advanced rocket engines. The blockhouse is a concrete dome designed to withstand a blast equivalent to five tons of TNT at 150 feet.

Prestressed Concrete Radiation Shield

Some 275 miles of wire will be used to prestress the upper section of the cylindrical, concrete radiation shield surrounding Consolidated Edison's reactor at Indian Point, N. Y. The 181-ft diameter concrete shell extends about 90 feet above ground level and will be roofed with a concrete dome. The bottom 70 feet of the shell are 5-ft 6-in. thick; walls in the upper 20 feet thicken on the inside to a thickness of 7 feet 9 inches at the top. On

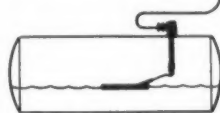


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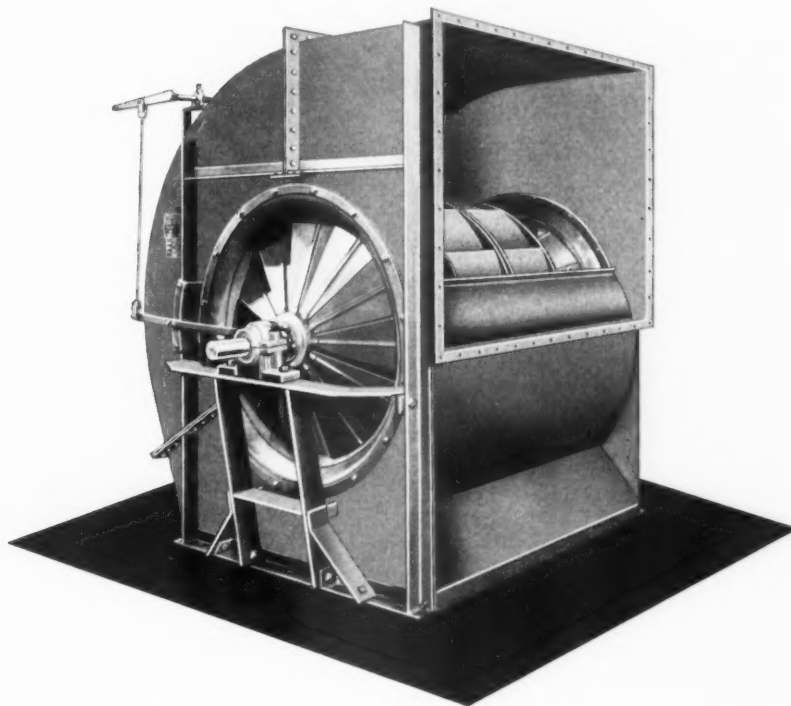


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line of superior fan equipment is built in 13 sizes, Classes II, III, and IV construction.

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the outside, a 3-in. deep chase in the upper 20-ft section will receive the prestressing wire.

Wire initially 0.192 inches in diameter will be drawn to 0.174-in. diameter as it is wound around the structure. The resulting stress of 150,000 psi in the wire will provide a total inward force of 7,120,000 pounds. This will counteract the horizontal forces exerted by the roof and forces from differentials in inside and outside wall temperatures.

The prestressing wire will be wrapped around the cylinder by a self-propelled machine that will be suspended from a special carriage traveling around the top of the wall near the outer edge. The wire will be wrapped in six layers, at the rate of one layer per week. Pneumatic mortar flashing will be applied over each layer.

New Ebasco Affiliate

Ebasco Services Incorporated has completed arrangements for its affiliation with Pacific Planning & Research, Inc., a city planning firm with offices in Sacramento and Palo Alto, California. The affiliation marks the continued expansion of Ebasco in the field of community planning and will provide Pacific Planning with additional resources in related fields. Pacific Planning's Palo Alto and Sacramento offices will be maintained, and the staff of each will work in conjunction with Ebasco's

San Francisco staff. In addition, the California offices will be able to draw upon the resources of the entire Ebasco organization.

Graphite in Flexible Form

The National Carbon Company now can convert organic textiles directly into 99.9 percent pure graphite, the end product remaining completely flexible and in the form it began as a yarn, braid, or woven or knit fabric. In the revolutionary process the textile is graphitized by electrically heating it to 5400 F, where the crystalline structure is changed to that of ordinary graphite.

Graphite's versatile electrical, mechanical, and chemical properties promise widespread application for the materials. Graphite has no melting point at ordinary pressure, subliming only at extremely high temperatures—about 6600 F; graphite increases in strength at elevated temperatures, its tensile strength at 4500 F being twice that at room temperature; and graphite fabrics are unaffected by liquid nitrogen at a temperature of minus 320 F. Graphite's lubricating properties extend its high temperature applications even further.

These new textiles also are resistant to acid, alkali, and organic compound attack, except those of a highly oxidizing nature, and do not react with many molten metals. They are excellent conductors, and since they are flexible, they are unaffected by thermal shock.

Experiments are being conducted using graphite cloth as a reinforcement for plastics and refractories in high temperature applications. Graphite cloth of the proper mesh is under study for bag-type filters for hot nonoxidizing gases and in electrostatic precipitators. Other applications include valve packing and gasket material for high temperature seals and conveyor belting for elevated temperature process equipment.

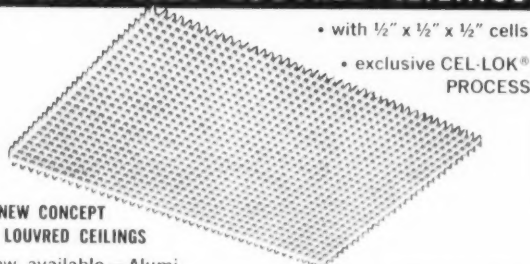
Mexican Newsprint Mill

Recently completed at Tuxtepec in the Mexican state of Oaxaca is a \$12-million, 80,000-sq ft sloping column newsprint mill. The two-story reinforced concrete structure is believed to be the only one of its type in the world. The outstanding advantage claimed for the unconventional column design is its resistance to bending in the event of severe earthquake loads.

Barrel-type sections, each 32-ft wide, provide an over-all length of 576 feet. Cross section spans are 64-ft long. Multiple arch thin-shell roof sections, with suspended aluminum ceilings, form an integral part of the ventilating system. Initial annual capacity of the new mill is 30,000 tons of newsprint.

Consulting engineer for the project is Sandwell & Co., Limited, Vancouver, British Columbia. ▲▲

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Now available—Aluminum Louvres with 1/2" x 1/2" x 1/2" cells. Neo-Ray MINI-CELL louvres now make possible overall luminous ceilings in 2' x 4' or 3' x 3' modular grid systems (or to specification) with the following advantages.

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ANOTHER
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NINE MILES OF NATIONAL-U.S. FINTUBE HEATING ELEMENTS USED IN CHICAGO HOUSING PROJECT



Contractors Hill & Ryba, and one of eight buildings comprising Stateway Gardens, new Chicago housing project.

National-U.S. Gas Boilers Also Supply Domestic Hot Water



Architect William Holabird, of Holabird & Root & Burger, the firm which planned Stateway Gardens for the Chicago Housing Authority.

Stateway Gardens, one of Chicago's largest housing developments costing more than \$17,000,000.00, provides higher living standards for approximately eight thousand residents of the 1,644 dwelling units in its six 17-story, and two 10-story buildings.

Heating for all eight is supplied through National-U.S. convector-type radiators—more than 47,000 linear feet of fin tube units enclosed in 66,000 linear feet of National-U.S. slope-top enclosures.

Hot water for faucet, laundry and general use is provided by seventeen National-U.S. "66" Series Cast Iron Gas Boilers.

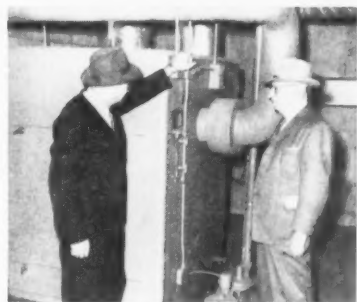
The bulk of the installation was handled by H. P. Reger & Co., one of the major firms dealing in plumbing, heating and air conditioning in the Chicago area. M. J. Holleran, Inc., one of Chicago's top five mechanical contractors, equipped two of the 17-story buildings.

Says Joseph W. Ryba, coordinator for the Reger Company, "One of the good features of working with the National-U.S. Radiator Fintube Units is that we were able to install a double row of the units in rooms which are unusually large, or which are subjected to more severe conditions than others. This



More than 66,000 feet of this National-U.S. Slope Top enclosure covers National-U.S. Fintube Radiators throughout the entire projects.

doubling up is done at practically no sacrifice in space, either."



Seventeen of these "66" Series Gas Boilers by National-U.S. assure ample domestic hot water for the families living in the 1,644 dwelling units.

Another advantage in using National-U.S. equipment is cited by Warren E. Hill, Vice-President of M. J. Holleran, Inc.

"We have found National-U.S. representatives thoroughly cooperative in all our dealings with them," he stated.

Full details on the equipment used in this important project are available. Inquire at our nearest office—see the yellow pages of your phone book—or write:

59-6

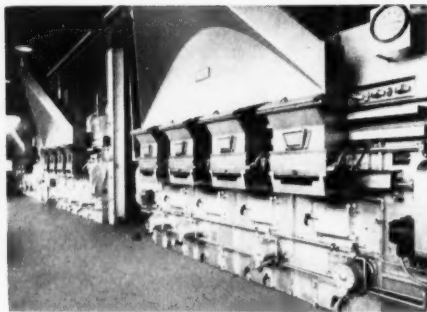


National-U.S. Radiator
CORPORATION

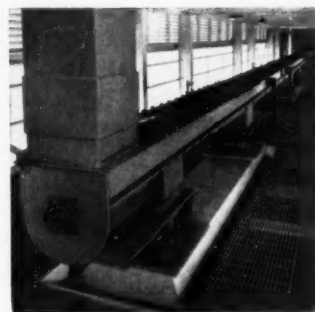
HEATING AND AIR CONDITIONING DIVISION
JOHNSTON, PENNSYLVANIA



At delivery point, coal moves by belt conveyor to bucket elevator which carries it to roof of plant. Here reversible screw conveyor delivers coal either to 430-ton silo or coal bunkers inside plant. Conveyors and silo by Fairfield Engineering Co. Outside storage is under trestle at right.



Looking down firing aisle at three Babcock & Wilcox 75,000 lb/hr boilers. Coal is gravity fed from bunkers through Stock Equipment automatic scales and non-segregating distributors to 4-unit Detroit Rotostokers.



Over coal bunkers. Roof screw conveyor moves coal to chute (left). Coal is then dropped to screw conveyor shown and is carried to any of three 100-ton storage bunkers underneath.

Coal sets pattern for low-cost steam

Fabric finisher burns coal for economy and availability

Modernity is the keynote of the new plant of Carlisle Finishing Co., a division of Cone Mills Corporation, Carlisle, S.C. Advanced planning and up-to-date techniques are evident throughout the company's entire operation.

The power plant, too, reflects this thinking . . . coal is used to generate the steam required for heating and processing. Chosen for its economy and availability, coal is burned and handled automatically by the latest equipment for peak efficiency. Also, the interior of this plant—designed by the consulting firm of J. E. Sirrine Co., Greenville, S. C.—has been decorated in cheerful colors to match the cleanliness of operation.

Coal is lowest cost fuel

Today, *when the annual cost of fuel often equals the original cost of the boilers*, you should know that bituminous coal is the lowest cost fuel in most industrial areas. And modern coal-burning equipment gives you 15% to 50% more steam per dollar, while automatic operation trims labor costs and eliminates

smoke problems. What's more, tremendous coal reserves and mechanized mining procedures assure you a constantly plentiful supply of coal at stable prices.

Technical advisory service

All companies planning a new power plant, or the remodeling of a present one, should consult an engineering firm on its design and construction. As a matter of fact, every Bituminous Coal Institute advertisement advises its readers to take this step. When you have such a project, our Engineering Staff will be glad to assist you in your fuel cost survey with any coal information you may require.

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Name _____

Title _____

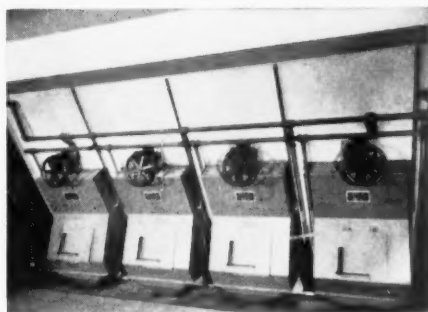
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Ash hoppers below furnaces drop ashes into sluice line for disposal. Ash handling system by United Conveyor Co. Fly ash from Western Precipitator collectors is reinjected by high velocity air.



ALCOA ALUMINUM CONDUIT...

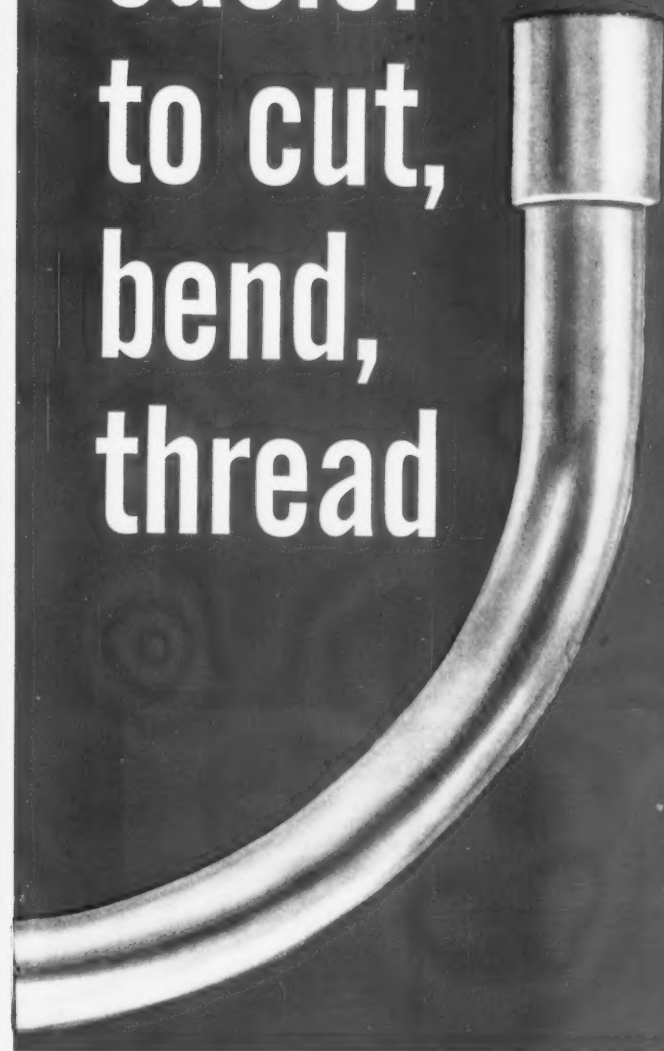
easier to handle,

easier to install,





easier
to cut,
bend,
thread



The choice is easy with three big reasons like these to back you up. Yes, Alcoa® Aluminum Electrical Rigid Conduit not only makes the job easier, but also provides a higher quality, longer lasting installation. More and more contractors and engineers are selecting Alcoa Conduit for a wide array of applications, industrial and commercial, even residential. Here's why:

1. Easier to lift, load, carry, erect and therefore more economical handling from start to finish—Alcoa Conduit weighs only one-third as much as conventional rigid conduit.
2. Alcoa Conduit is easier to cut, bend, thread . . . faster, too.
3. Wirepulling is easy—Alcoa Conduit is specially lubricated at the factory.
4. Selection of sizes is simple with Alcoa color-coded thread protectors.
5. Alcoa Conduit is competitive in price.

ALCOA CONDUIT ALSO OFFERS YOU . . .

1. Lower installed cost—this has been proved . . . is being proved over and over by cost- and quality-conscious contractors and engineers everywhere.
2. Longer life, less maintenance—Alcoa Conduit is corrosion resistant through and through, needs no painting under normal service conditions.
3. Clean, distinctive appearance that lasts and lasts.
4. Approved by Underwriters' Laboratories, Inc.

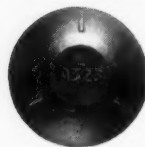
Take advantage—now—of the many new benefits offered by Alcoa Aluminum Electrical Rigid Conduit. Immediate delivery of conduit, couplings and elbows in sizes 1 in. to 6 in. from strategically located distributor stocks. Aluminum Company of America, 2145-E Alcoa Building, Pittsburgh 19, Pennsylvania.

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New



The "A 325" and three radial marks on the head guarantee that this bolt is made of high carbon steel, and meets or exceeds rigid ASTM A 325 specification. The "L" identifies it as a genuine Lamson & Sessions bolt.



This nut is used with both the Lamson High Strength Bolt and the Lamson High Strength Bearing Bolt. The three long indented arcs on the ends of the nut indicate that it meets or exceeds ASTM A 325 specification. The short dashes between the arcs identify it as a genuine Lamson nut.

structural bolt

Combines the tensile strength of a hex head high strength bolt with the bearing of a rivet.

Has the highest shear strength and greatest resistance to slip of all structural bolts...it's the new

LAMSON HIGH STRENGTH BEARING BOLT*

COMPARISON TABLE			
	DARDELET RIVET BOLT	HIGH STRENGTH BOLT	HIGH STRENGTH BEARING BOLT
ASTM designation	none	A 325	A 325
Comparative shear strength (% Dardelet=100%)	100%	159%	177%
Tensile strength	70,000 lbs.	90,000 to 120,000 lbs.	90,000 to 120,000 lbs.
Resistance to slippage	good	fair	excellent
Resistance to vibration	good	good	excellent
Men required to install	one	two	one
Equipment required	sledge and hand wrench	impactor and hand wrench	maul and impact wrench
Installation cost	equal to or less than rivets	less than rivets	less than rivets
Washers required	none	two	one

*Pat. App. for
†Cost based on using bolts with
nuts and washers as shown.

This new high strength bearing bolt—developed and manufactured by Lamson—offers design, erection and structural advantages over both the hex head high strength structural bolt and the Dardelet Rivet bolt.

Size for size, this new bolt costs the same as the other two,[†] yet provides a more rigid structure at less cost. Field tests have proved its superiority beyond doubt, and already many structures have been erected using this bolt.

The new Lamson High Strength Bearing Bolt is available now through 20 U. S. Steel Supply Division Steel Service Centers in key locations throughout the country.

Write Lamson & Sessions for Bulletin HSBB. Contains pertinent engineering data. Firm names, and locations where these new bolts have been used will be mailed promptly on request.

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Books

Parallel Reading for Consulting Engineers

The Angers of Spring is a first novel by a young man, Joseph Whitehill, who is not himself an engineer, but he seems to have a good understanding of things engineering. It is obvious that he is familiar with the details of electronic applications, which is more, perhaps, than can be said of most engineers, and he certainly knows how a small company operates. He demonstrates this background in his novel, through his principal character,

a young and fresh-out-of-school engineer, by the name of Paul Mockley.

Paul decides he would prefer employment in a small firm rather than follow his fellow graduates into the training groups of the great industries. He finds himself a job, and finally a girl, at a small Oklahoma firm, the Ragle Measurement Company. A certain sharpness and a driving ambition quite believably take him fairly well up

the line in just a couple of years. He steps on a fellow employee here and occasionally one there, but he is a rather likable chap, and the reader is generally sympathetic.

There is not much body talk or bed play in the book, as modern novels go, but what there is is well handled. Paul finally takes time enough off from his work to pay a little extracurricular attention to the lady draftsman with whom he has been working for two years, and the ensuing seduction scene is the best episode in the book. To say that it is funny would be stretching it, but it is amusingly real, if one can remember back that far.

The engineering aspects would have been a little more understandable to us, and probably to most other readers, if the hero had been a civil, mechanical, or electrical engineer instead of a graduate in electronics. Perhaps Mr. Whitehill will try that next time. This is not, you can be sure, his last novel, for he is a competent writer. He needs to use up his remaining store of old jokes and sophomoric savings and look for some new ones, but he is young.

Engineers will enjoy reading this novel — as will their wives.

If It Had Been a Snake is presumably a novel, and it was written by an engineer, but that is not to be taken as a recommendation. It is easy to see how it could have been written, but it is hard to understand how it could have been published. Monroe J. Willner, the author, may be an excellent engineer, and we sincerely hope he is, for he is no writer. Unfortunately, the publishers assigned him either a wretched editor or no editor, for the book overflows with excess writing, bad grammar, poor punctuation, and the most ridiculous constructions.

The idea is to show what it is like to go through engineering school and then go out into the big bad world where engineers are not appreciated for the true intellectuals



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your costs go down**

**Write for free bulletin SS-202
illustrating how to get greater
return from your stack
investment**

A. O. Smith Corporation, Dept. CE-59, Milwaukee 1, Wis.
Please send me a copy of the Permaglas Smokestack
Bulletin No. SS-202.

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2500 lb.
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BODIES**

for **HIGH PRESSURE AND
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CALL YOUR FISHER/MAN

Guides and bushings are Stellite faced to prevent seizing or galling. Guide posts are made extra large. This extra protection means longer life.



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Screwed-in seat rings are Stellite faced to eliminate erosion and wire drawing. Fisher seal welds them in place to keep rings from working loose and to prevent leakage past the threads.



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Available in single or double ported body designs—one and two inch sizes in the single ported and two, three and four inch sizes in the double ported design.



CALL YOUR FISHER/MAN

Use of a pressure sealed bonnet eliminates need for heavy, cumbersome flange heads. Head construction with or without cooling fins is available.

CALL YOUR FISHER/MAN

or write FISHER GOVERNOR COMPANY for complete information and literature.



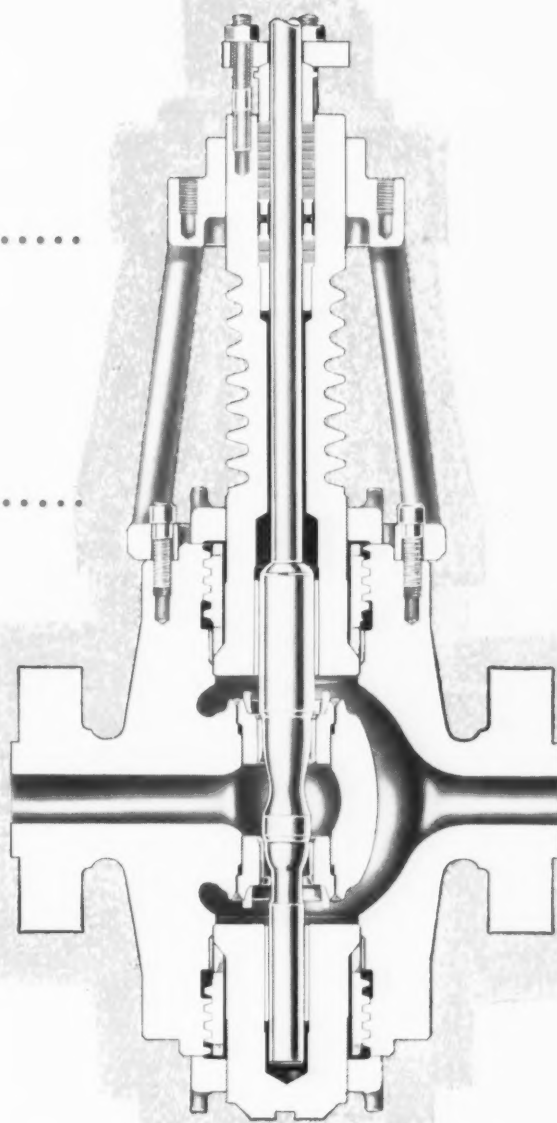
IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY...

FISHER GOVERNOR COMPANY

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SINCE 1880



they are. The author fails, unfortunately, to make his point anywhere along the line. He tries to show Georgia Tech as a mentally challenging college full of bright young brains. The picture that actually develops is one of a hard senior high school inhabited by a bunch of mixed up kids.

Mr. Willner touches, barely touches, on every major problem of western technological civilization — racial prejudice, education, unionism, professionalism, mass employment of engineers, mental telepathy, and just about everything else that crosses his mind — but he comes to no conclusions and makes no recommendations. He fails to even state the problems.

Apparently under the impression that in writing a novel he must have some girls in it, there are included some characters with female names. The main character (a male name) at one time shows something resembling a casual ro-

mantic inclination toward one of the female names in the early part of the book, but the author writes about this relationship as though he were afraid his wife was going to read it.

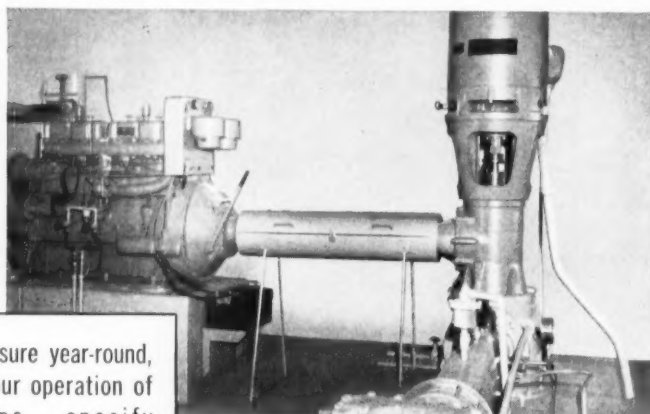
The Ugly American is a surprisingly bad piece of writing dealing with a most important subject.

Yet, this is not a book that should be passed over slurringly. It calls attention to a truly deplorable condition, and its wide circulation, alone, (it was a Book-of-the-Month Club selection) might be of some benefit. An engineer, reading this book, must not spend too much time condemning the authors for their small inaccuracies or their major technical mistakes. The reader should approve the spirit of the authors' argument that in the technically backward countries, pumps are, at this stage, more important than huge hydroelectric plants. This is an important point,

and one with which most consulting engineers will readily agree. It would not be hard to find consultants who would prefer that the World Bank make more small loans for development of local industries than large loans for great harbor, power plants, and highway projects. Consulting firms might not have the same reasons for this preference the authors have, but the ultimate accomplishments would be the same so far as the people themselves are concerned.

A practical engineer has to accept the pedal-powered pump vs. central station power plant argument as intentionally exaggerated, despite the authors apparent effort to have their example taken quite literally. If taken literally, they defeat their purpose for their extreme would be as great a technical handicap as overemphasis on heavy engineering construction. True, the major hydroelectric project is so far removed from the Asian peasant that he feels no direct benefit, especially when the power generated is distributed primarily to heavy industry, leaving the small farmer's cottage as dark as ever after sunset. But to replace central stations with reciprocating pumps having power take-off from old bicycles is as asinine at the other extreme.

Pumps will pump water; that is all. Electric power will pump water, light homes, provide heat, and do thousands of chores that need to be done in both rural and urban Asia. It would seem better to split the difference and make available to Asians small, low voltage generators in every village. Power might not be produced so efficiently as in the great central stations, but local plants could be seen and touched — and operated without technical training (anyone who could run a tractor could run a small diesel-electric plant), and they would permit not only the pumping out of the rice fields but also the setting up of small indus-



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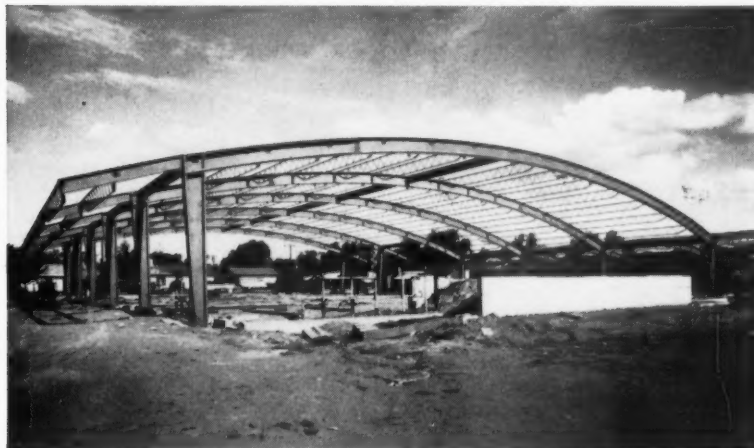
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REDESIGN SAVES 10%

A 45 ton girder which is part of the new Dept. of State Building under construction in Washington, D.C. was originally designed for rivets. According to Werner Quasebarth, general manager of Atlas Machine and Iron Works of Arlington, Va. where the 14 foot deep by 75 foot long member was fabricated, redesign for welding resulted in a 10% reduction in weight and 10% lower labor costs.

Mr. Quasebarth states that as the result of a cost reduction study conducted in the Atlas shop by Lincoln welding engineers, Atlas has been able to effect even greater economies. Production on some operations has been increased as much as 50%.

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tries for processing rice, making paper, canning, or even light metal working.

This extreme position of the authors in recommending the primitive as the only alternative to the highly technical seems to us a major mistake, but if taken with several grains of rice, it is a worthy appeal for a change in our foreign aid policies as well as our administration of them.

The consulting engineer who has

handled projects abroad will enthusiastically endorse the authors' descriptions of the idiocy surrounding American administration. Consulting engineers have seen government engineers and State Department or ICA officials in Asia and the Middle East, at work and play, and have returned to this country ashamed of their fellow Americans. Consulting engineers may, themselves, be guilty of many of the sins described, but taken as

a whole, the consultant is the least guilty of the lot — and for good reasons. The consultant is accustomed to dealing directly with some none too reasonable clients even in this country. The most unusual attitudes of Asian clients do not seem more strange to a consulting engineer than those he encounters daily in dealing with some American architects, city officials, and top industrial managers. This contrasts with the experiences of government engineers and even the engineers in industry, whose incomes seldom depend on their ability to get along with a wide variety of personalities and some most unusual attitudes.

The consulting engineer will find much with which he can agree in this book, despite the authors' magnificent engineering naiveté.

(See page 240 for a list of publishers and prices.)

For The Office

IN THE FALL of 1957 a remarkable conference was held in Hartford, Connecticut, called by the Connecticut Life Insurance Company. Its purpose was to bring together civic and engineering leaders with an interest in the many urban problems being created by the vast expansion in ownership and use of motor vehicles.

The motivating factor behind this conference was the simple fact that there is a highway problem. But, more and more, it is being recognized that the highway is more than a river of moving vehicles; the highway, itself, is an influencing factor that can, and possibly will, determine the direction of development of an entire metropolitan area. The end result may be good or bad, depending upon the way in which the problem is attacked.

Resulting from the conference is a rather remarkable book, *Cities in the Motor Age*, written by Wilfred

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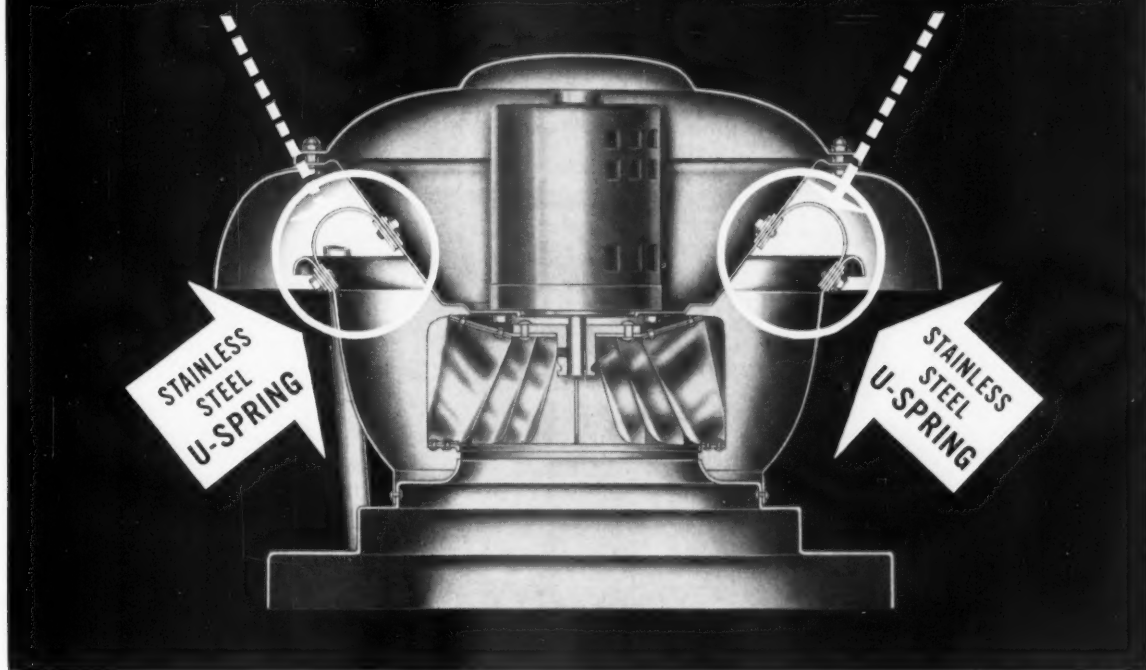
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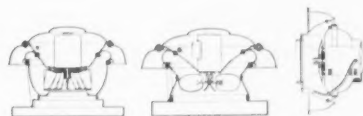
that would not break down. What they perfected was a unique power assembly suspension system built around stainless steel U-springs. Three to five U-springs are now used in each direct driven Jenn-Air Exhauster. They eliminate noise by isolating both radial and lateral vibration . . . and they're *guaranteed for life*.

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Owen, a man of broad experience in the field of transportation and related problems. The book is not so much a meticulous report of a confidence as it is a reporter's report in which the author, in his own words, synthesizes what has been said so that it becomes an integrated whole.

Perhaps the most significant contribution of this book is its advocacy of the theory that to solve the highway problem, if it can be

solved, will require a total strategy for the urban areas. The over-all skeins of planning, in the broadest sense, must be brought together in one master concept which will transcend any limited plan that puts undue emphasis on a particular phase of urban development.

Improvisation, in which the day-to-day problems of congestion are tackled through use of expedients, cannot be expected to produce more than a continuation of a con-

dition in which the more we build, the worse the situation becomes.

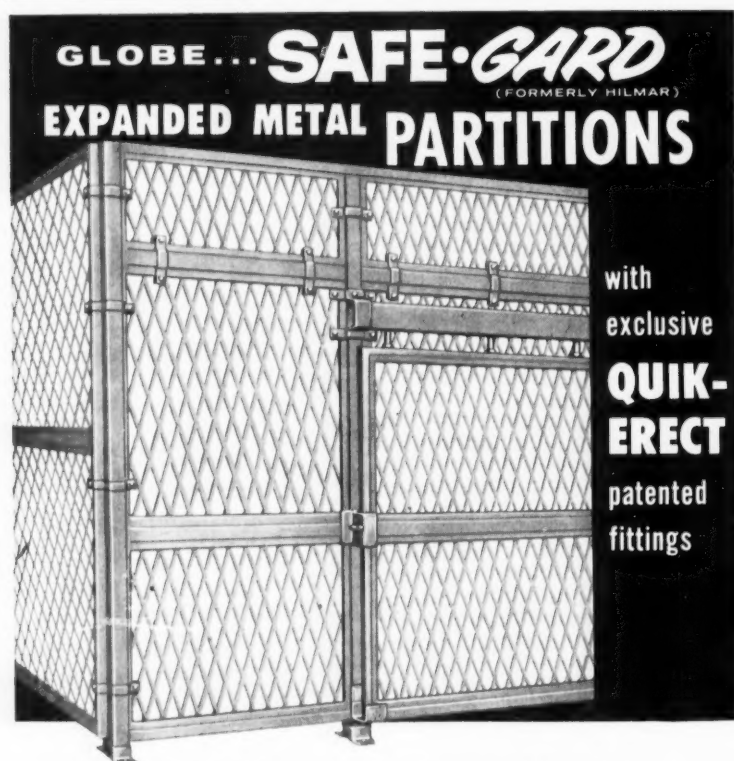
"The close-packed city," the author writes, "is to a large extent obsolete. Its obsolescence makes it inefficient as a place to work and unpleasant as a place to live. It will take far greater forces of renewal than anything seen to date to reverse the trend toward further deterioration. The newer suburbs have repeated too many of the mistakes of the central cities and have too few of their virtues. In the sprawl of subtopia the new-style blight of the motor age will be added to the over-crowded slums of the railway age."

That is the nature of the problem. The solution, the total strategy, is well set forth in the concluding chapter of the book, which will interest every person who has even the remotest influence upon any phase of urban or suburban development work.

*Howley S. Simpson
Simpson & Curtin*

CATALYSIS, VOL. 6—HYDROCARBON CATALYSIS, edited by Paul H. Emmett, is the sixth in a series of seven volumes, which constitutes a treatise to summarize the present status of the subject. The first two volumes basically are concerned with fundamental principles and are aimed specifically at catalysts themselves and basic heterogeneous and homogeneous catalysis theories. Volume 3 is designed to cover the subjects of catalytic hydrogenation and dehydrogenation; Volume 4 presents complete coverage of Fischer-Tropsch synthesis; and Volume 5 includes several subjects, such as hydrogenation, hydrocracking, and hydrodesulfurization. Volume 7, presently being prepared, will deal with catalytic oxidation, hydration, dehydration, cracking catalysts, and studies of electronic structure as affecting catalyst activity.

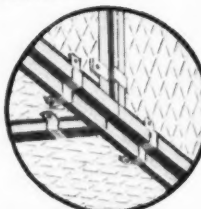
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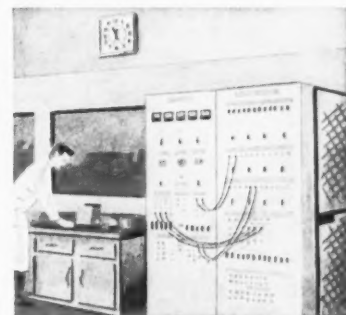
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are: alkylation of paraffins with olefins, isomerization, polymer formation and decomposition, polymerization of olefins, catalytic cracking, and catalytic reforming.

As is common in treatises of this type, where each chapter is written by a different author, the emphasis is subject to the interests of the author. In all of the chapters, the important catalytic cause and effect relationships are described—sometimes through the use of qualitative

description, and sometimes through theoretical and empirical developments. Each chapter contains a substantial review of the literature on the particular subject matter and also provides the reader with timely bibliographies.

The consulting engineer who is concerned with hydrocarbon catalytic reactions will find this volume useful, particularly the chapters on polymerization of olefins, catalytic cracking, and catalytic reforming,

which discuss commercial applications, in these fields.

Carl R. Sandin

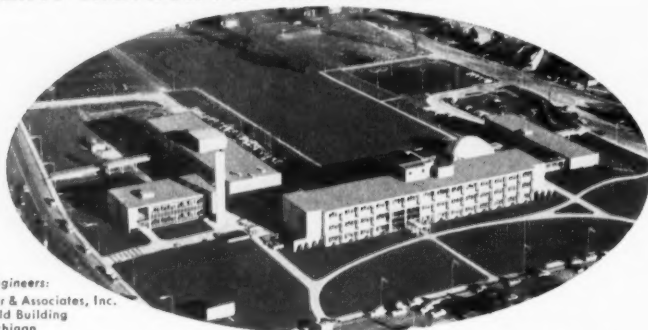
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ENGINEERING VIBRATIONS, by Lydik S. Jacobsen and Robert S. Ayre, provides a vast amount of information for the practicing engineer concerned with vibrations of structures and machinery. In addition to over 400 drawings and many graphs and tables, there are over 450 solved examples and problems, and 600 classified references.

The authors' approach embraces practical applications and, in general, favors engineering aspects rather than purely mathematical and philosophical developments. Although the reader should have some working knowledge of differential equations for the effective use of this text, there is much to be gained from the various approximate methods of the graphical, graphoanalytical, and other procedures that have been included. Particular emphasis is placed on nonlinear systems, the transient state of motion, damping, and friction. In fact, more material probably is included on these important phases of modern structural dynamics than could be found in a multitude of references.

In addition to single-mass systems under free vibration and under transient and steady-state motion from various types of forcing functions and pulses, there is a generous treatment of multi-degree-of-freedom systems with lumped masses and systems with distributed mass and elasticity. The examples with application to structures and machinery make these particularly valuable. Although an engineer looking for earthquake resistant design procedures, per se, will not find them in this book, he will find much information about how structures vibrate. This knowledge should make him better able to understand complex earthquake phenomena, and structural-dynamic research results which have been

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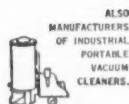
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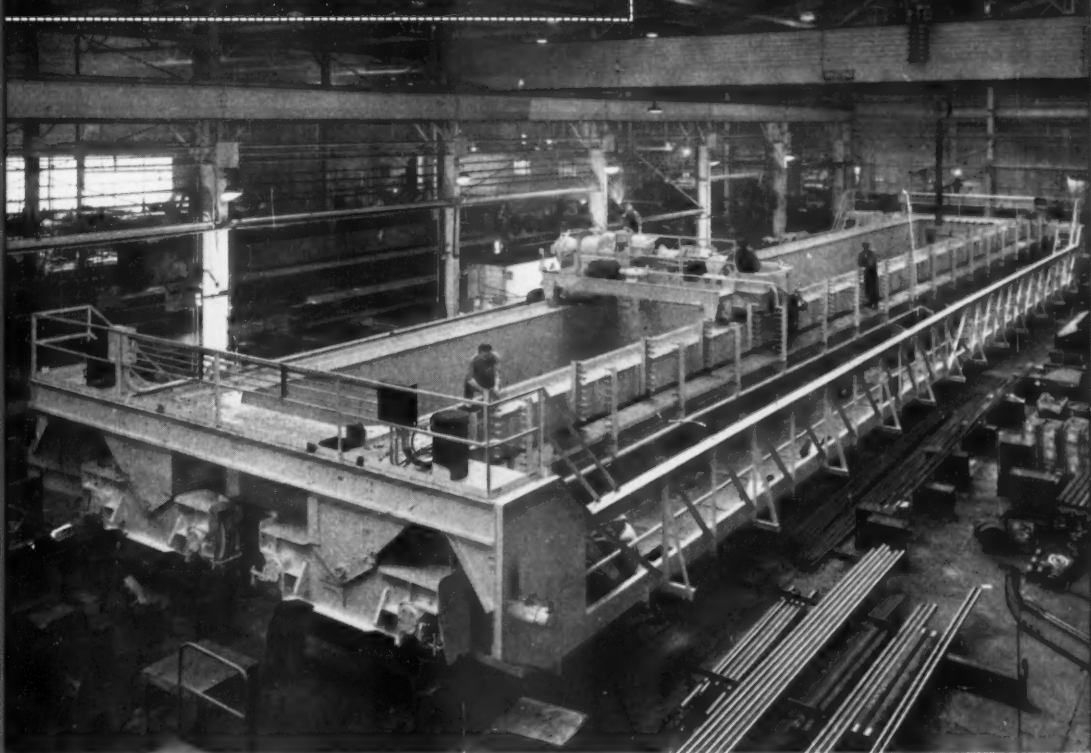


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Structural designers and engineers who hope to cope intelligently with impact, blast, earthquake, or other moving load or disturbance problems would do well to use this textbook as an effective tool to build an appreciation of nonstatic problems. It should be in the office library.

John A. Blume
Consulting Engineer

THE ATTENUATION OF GAMMA RAYS AND NEUTRONS IN REACTOR SHIELDS, by Herbert Goldstein; United States Atomic Energy Commission; 295 pp.; \$2.00. This review of reactor shielding fundamentals is intended to serve as a solid scientific base for the steadily advancing art of reactor shield design.

Extensive theoretical analyses, bulk shielding measurements, and often even full-scale mockup tests are required in the design of indi-

vidual reactor shields. Each of these steps in the design procedure can be accomplished successfully by proceeding from first principles, with a clear understanding of the basic phenomena involved in radiation attenuation.

It is to these fundamental aspects of shielding that this book is directed — the factors affecting permissible radiation levels; the sources and characteristics of the radiation encountered; bulk shielding facilities and measurements; and, at greatest length, the methods for calculating, either theoretically or empirically, the attenuation of neutrons and gamma rays in shield materials.

Copies may be ordered from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

HANDBOOK OF INDUSTRIAL LOSS PREVENTION, by Factory Mutual Engineering Division; McGraw-Hill Book Co., Inc., N. Y.; 864 pp., 203 tables, 634 drawings; \$20.00. Modern methods and equipment for avoiding damage to industrial plants and processes are covered in this new manual — a comprehensive handbook of fundamentals, procedures, and data for protecting factories and processes against damage by fire, explosion, lightning, wind, and earthquake.

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SALE-LEASEBACKS AND LEASING IN REAL ESTATE AND EQUIPMENT TRANSACTIONS, by Harvey Greenfield and Frank K. Griesinger; McGraw-Hill Book Co., Inc., N. Y.; \$15.00. This report analyzes the pros and cons of using sale-leasebacks and equipment leasing, discusses the business, tax, legal, and accounting factors involved, and gives case histories to illustrate the points covered.

It stresses the intelligent use of long-term credit in solving facilities

acquisition, replacement, and marketing problems, and also examines leasing in relation to other financing alternatives.

Practical real estate problems facing both management and investors are considered, new developments in financing are noted, and legal and tax problems encountered in sale-leasebacks are covered in nontechnical language. In addition, the authors treat the leasing of passenger cars, trucks,

and other specialized forms of leasing arrangements.

MATERIALS FOR NUCLEAR REACTORS, edited by Bernard Kopelman; McGraw-Hill Book Co., Inc., N. Y.; 424 pp.; \$12.00. This book presents a comprehensive and systematic treatment of the atomic fuel cycle and the preparation, properties, and behavior of the most important materials in nuclear reactors.

Thirty specialists carefully describe the use-cycle of uranium — from ore to chemical reprocessing of spent fuel elements to recover unburned portions of the fuel. Chemical, physical, and mechanical properties of the other materials found within a nuclear reactor, and the effects of irradiation on these properties are examined. The book thus serves as a compendium of the advantages and limitations of various materials as fuel elements, coolants, moderators, shields, and structural components.

The text includes over 150 illustrations and a useful chart on the interaction of radiation with matter.

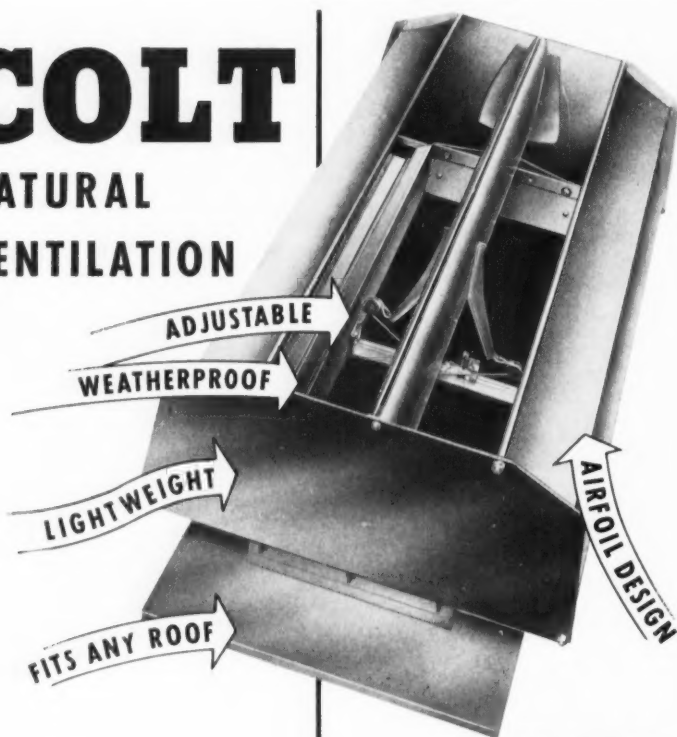
GUIDE TO THE LITERATURE OF MATHEMATICS AND PHYSICS, Including Related Works on Engineering Science, by Nathan Grier Parke III; Dover Publications, Inc., N. Y.; 436 pp.; \$2.49. This unique mathematics literature guide includes over 5000 entries under 120 subject headings, covering every important branch of mathematics, physics, and engineering.

All referenced books were selected on the basis of current significance, completeness, and ability to give clues to the reader for further material on a subject. Every entry includes author, title, publisher, place, date, and number of volumes or pages. Discussions of the literature under each heading define the subject and provide cross-references and suggestions for investigation.

An up-to-date listing of agencies and individuals engaged in Russian translation programs is included.

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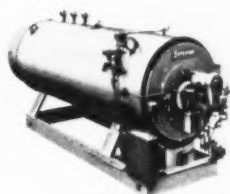
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Ideally the furnace is located near the center of the shell, where it is protected from the two most common dangers which can cause bagging, blistering or complete burnout of the furnace.

The first of these dangers is low-water. When the furnace is located too high in the shell, the covering layer of water is necessarily less, and the danger is increased. When the furnace is too low within the shell, mud and silt can deposit on the bottom of the shell and eventually bridge to the bottom of the furnace, cutting off circulation and causing a burnout of the furnace. The adjacent diagrams show the location of the furnace in other fire-tube boilers and in Superior Type C boilers. When you buy or specify a packaged fire-tube boiler consider this important fact.

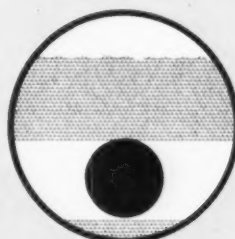


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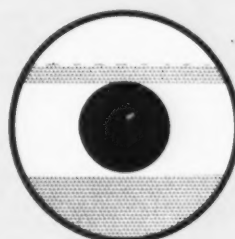
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HIGH FURNACE...LOW WATER BURNOUT DANGER



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The book also contains a listing of bibliographical aids – abstracts, indexes, periodicals, reviews, encyclopedias, documentary reproductions – and a comprehensive author-subject index. It is a valuable reference to have around.

HIGH TEMPERATURE WATER SYSTEMS, by Owen S. Lieberg; The Industrial Press, N. Y.; 224 pp.; \$6.50. This authoritative volume on high temperature hot water systems thoroughly explains principles, design, and operating characteristics of this modern method of heat distribution. The author, designer of some of the largest heating systems of this type in the United States, Canada, and England, includes much of the design data he has used successfully.

Critical areas in high temperature hot water design are stressed: the theory and practice of pressurization; pump selection; boilers and valves; and piping and controls. Two chapters are devoted to space and process heating, including applications of high temperature hot water design are stressed: central fan systems, and water-to-water heat exchangers, as well as with convertors for space heating, domestic hot water, and low pressure process steam.

A full chapter is devoted to the step-by-step design of a typical system. The appendix includes a complete specification for a boiler and its auxiliaries.

Of particular importance to the consultant is a detailed economic analysis of high temperature hot water systems in comparison to high pressure steam systems.

ADVANCES IN MATERIALS HANDLING; American Society of Mechanical Engineers, N. Y.; \$4.50. The thirteen engineering papers comprising this book were presented at the 1958 Materials Handling Conference. One group is concerned with scientific management in materials handling; another with new developments in pneumatic materials handling, industrial bulk handling, and the application of advanced materials handling techniques to nonmass-production plants. A third grouping deals with the design and development of special equipment for high capacity bulk handling and for handling nuclear materials. The fourth group discusses radioactive materials handling and material handling equipment for missile launching facilities.

DIAPHRAGM CHARACTERISTICS, DESIGN AND TERMINOLOGY; American Society of Mechanical Engineers, N. Y.; \$3.75. This manual, published by A.S.M.E., outlines uses, performance characteristics, and effects of design details and manufacturing methods on the characteristics of diaphragms. Appendixes

SECTION THROUGH TRACK



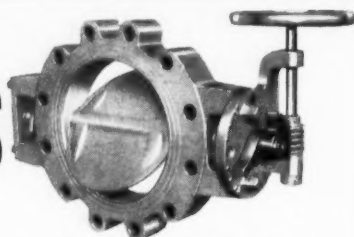
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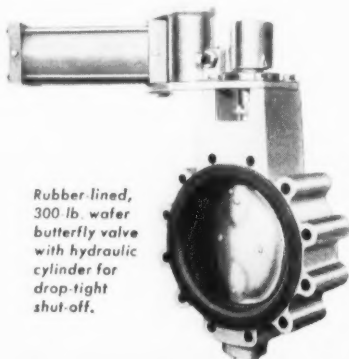


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OUTDOOR



define the terms and notations used, describe equipment and methods of testing, classify applications of diaphragms, and give the various equations necessary for their design.

A VIBRATION MANUAL FOR ENGINEERS, second edition, (PB131785), by T. R. McGoldrick; U. S. Navy; 32-pp.; \$1.00. The purpose of this rather thin but useful manual is to enable the practicing engineer

to expedite calculations on mechanical vibration problems. Most of the formulas presented conform with the inch-pound-second system of units, and are illustrated and explained. The booklet was prepared by the Structural Mechanics Division of the Navy's David Taylor Model Basin. It may be ordered from the office of Technical Services of the United States Department of Commerce, Washington 25, D.C.

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Reader Service Dept.,
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217 Wayne St., St. Joseph, Mich.

The Angers of Spring, by Joseph Whitehill, Little, Brown & Company; \$4.50.

If It Had Been A Snake, by Monroe J. Willner, Vantage Press, Inc.; \$5.00.

The Ugly American, by William J. Lederer & Eugene Burdick, W. W. Norton & Co., Inc.; \$3.95.

Cities in the Motor Age, by Wilfred Owen, The Viking Press, Inc.; \$3.95.

Catalysis, Volume 6 - Hydrocarbon Catalysis, edited by Paul H. Emmett, Reinhold Publishing Corp.; \$19.50.

Engineering Vibrations, by Lydick S. Jacobsen and Robert S. Ayre, McGraw-Hill Book Co.; \$10.00.

The Attenuation of Gamma Rays and Neutrons in Reactor Shields, by Herbert Goldstein, United States Atomic Energy Commission; \$2.00.

Handbook of Industrial Loss Prevention, by Factory Mutual Engineering Division, McGraw-Hill Book Co., Inc.; \$20.00.

Sale-Leasebacks and Leasing in Real Estate and Equipment Transactions, by Harvey Greenfield and Frank K. Griesinger, McGraw-Hill Book Co., Inc.; \$15.00.

Materials for Nuclear Reactors, edited by Bernard Kopelman, McGraw-Hill Book Co., Inc.; \$12.00.

Guide to the Literature of Mathematics and Physics, Including Related Works on Engineering Science, edited by Nathan Grier Parke III, Dover Publications, Inc.; \$2.49.

High Temperature Water Systems, by Owen S. Lieberg, The Industrial Press; \$6.50.

Advances in Materials Handling, American Society of Mechanical Engineers; \$4.50.

Diaphragm Characteristics Design and Terminology, American Society of Mechanical Engineers; \$3.75.

A Vibration Manual for Engineers, by T. R. McGoldrick, U.S. Navy; \$1.00.

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When you install a B&G Heat Exchanger, you have assured yourself of not only high efficiency, but highest quality construction.

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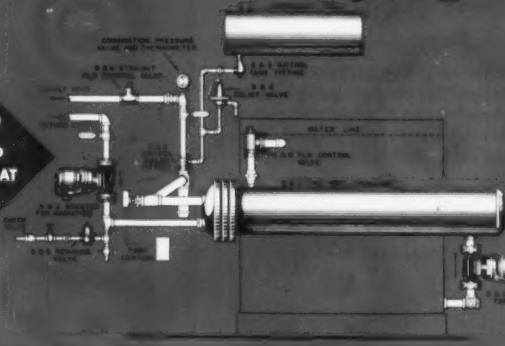
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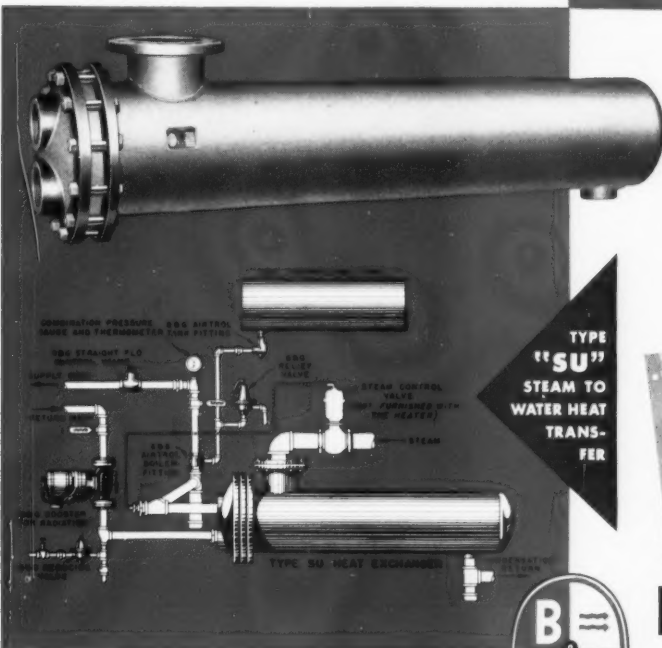


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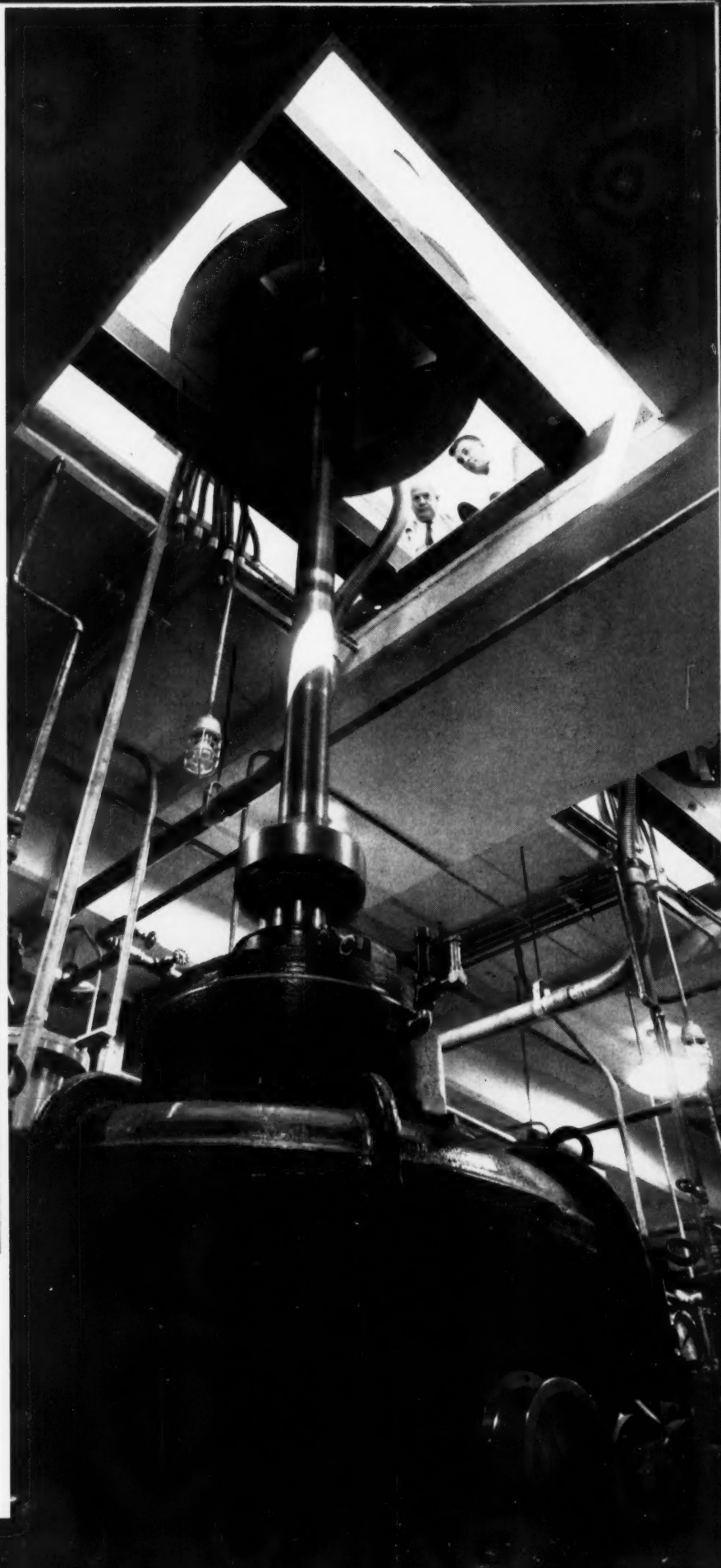
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View from pump floor in Oswego, New York, pumping station showing one of main pumps being driven by Westinghouse 300-hp vertical synchronous motor above.



Robert B. Stannard, Resident Engineer for Nussbaumer, Clarke and Velzy, Consulting Engineers; Karr Parker, Jr., Buffalo Electric Co.; Kenneth D. Jensen, Superintendent, Department of Water, Oswego; and M. B. Trimble, Westinghouse Construction Sales Engineer, discuss "tilt-out, lock-out" feature of the control center. Westinghouse double-ended control power center has 300-kva In-terteen® transformer at each end.

Oswego water pumping station Powers-Up to attract new industries

The modernization and expansion program of the Department of Water, Oswego, N. Y., provides an interesting example of building today for tomorrow's needs. While planning for today, Oswego's Water Board recognized that a good water supply is an indispensable commodity in attracting new industry to the area. By Powering-Up electrically, their new pumping station has electrical capacity five times present demand to allow for future growth.

Present demands for water are approximately 10 million gallons per day. Installed pumping capacity is capable of providing more than 20 million gallons per day. In addition, provision has been made to increase capacity to 35 million gallons per day when required by future demands.

The new pumping station is supplied with lake water from an intake tunnel which extends through solid rock for a distance of 6250 feet into Lake Ontario. This tunnel intake averages eight feet in diameter and is capable of conveying 128 million gallons of water per day.

Electrical power for the station is available from two separate sources—one direct from the Oswego Steam Station and the other from the Niagara-Mohawk Varick Station. The complete electric distribution system, as furnished by Westinghouse, provides for all anticipated future expansion of the pumping station.

Powering-Up electrically for future growth can offer important advantages to you. For further information, call the Westinghouse electrical engineer nearest you, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94119

Owner: Department of Water, Oswego, N. Y.

Consulting Engineers:

Nussbaumer, Clarke and Velzy

General Contractor: McElwee-Courbis Const. Co.

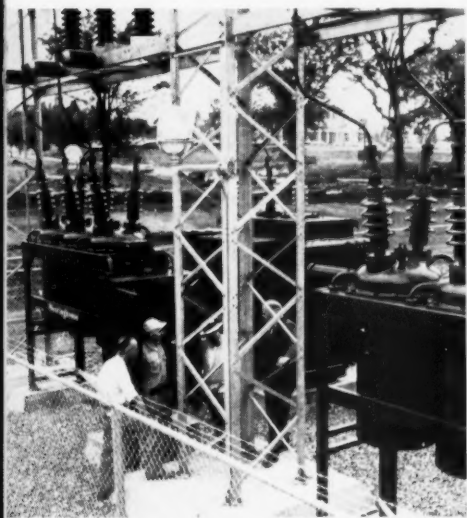
Electrical Subcontractor: Snyder and Mackin, Inc.

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Leo J. Landrigan, Superintendent, Oswego Pumping Station; Richard C. Mansfield, Foreman for Snyder and Mackin, Electrical Contractors; Kenneth D. Jensen; and Charles T. Hansen, Westinghouse Sales Engineer, at outdoor substation which serves new Oswego pumping facility. Two Westinghouse 2000-kva power transformers and two Westinghouse 34.5-kv oil circuit breakers are included in this substation.



Main floor view in pumping station shows four Westinghouse vertical synchronous pump motors with the glass enclosed control room in background. The mezzanine floor above is occupied by Westinghouse 2300-v, heavy-duty, metal-clad switchgear, using Type DH air circuit breakers.



Another view of main floor shows reverse side of control room and, on the mezzanine, Westinghouse double-ended control power center. Floor openings in foreground, not shown, have been provided for the installation of four additional raw water pumping units when filter plant is added.



Men in Engineering

Magney, Tusler and Setter, architectural and engineering firm of Minneapolis, has changed its name to Magney, Setter, Leach, Lindstrom and Erickson, Inc. Principals of the new firm are John R. Magney, Donald P. Setter, Stowell D. Leach, John Lindstrom, and Hugo Erickson, who recently resigned as Minneapolis city engineer. It also was announced that Wilbur H. Tusler, second of the original founders of Magney, Tusler, and Setter, has retired as a

principal but will continue as a consultant to the new firm. The company will remain at its present location at 303 Roanoke Building.

James T. Pott, senior civil engineer with the engineering office of Clyde C. Kennedy, San Francisco, California has been selected by this firm as the first participant in the Honors Cooperative Program for advanced study at Stanford University. The firm is the first engineering organization to inaugu-

rate the cooperative training program in the civil engineering department. Previous participants have all been in electrical fields. The Honors Cooperative Program provides a regular basis of advanced study for practicing engineers, enabling them to combine work toward Master of Science, Engineering, or Doctorate degrees with professional assignments and financial support from the sponsoring firm.

George E. Bell, senior sanitary engineer in the firm's engineering office, has been named head of the laboratory and testing department.

Promotion of two top management executives has been announced by Stone & Webster Engineering Corporation. Fred W. Argue, engineering manager and a vice president,



ARGUE

HARTBRIDGE

has been elected executive vice president, and Alfred L. Hartridge, treasurer and a vice president, financial vice president.

In other actions of the board of directors of the firm, Richard N. Benjamin, president of Stone & Webster, Inc., was elected as a director of Stone & Webster Engineering Corp. and F. E. Conger was appointed assistant secretary.

Robert L. Boehmig has opened an office for the practice of structural engineering. It is in the Bona Allen Building, Atlanta, Georgia.

Six engineers have been named associates of Hazen and Sawyer, engineers of New York City. They are: C. Richard Walter, Francis

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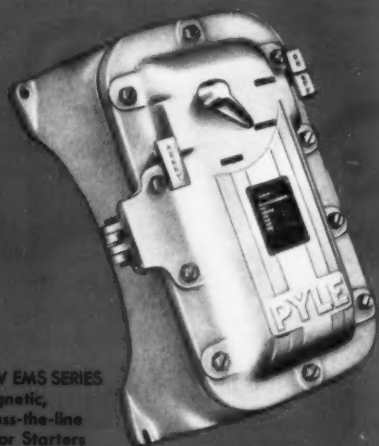
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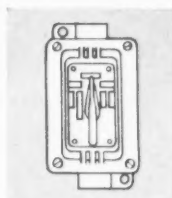
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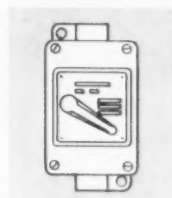
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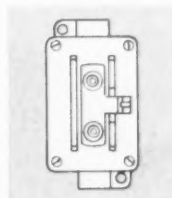
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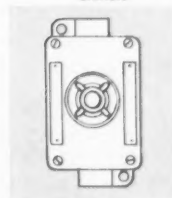
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P. Coughlan, Jr., Remig A. Papp, Joseph N. Rizzi, Jr., John W. Neave, and Walter B. Sinnott.

Fernand J. Leger, Consulting Engineer, has moved his office to 10060 Place Guillaume Chambon, Montreal, Quebec, Canada.

Sam Starr, P.E., formerly with the firm of Edward E. Ashley, has been appointed chief electrical engineer of Jansen & Rogan, consulting engineers of New York City.

Ebasco Services Incorporated announce the appointment of F. A. Ritchings as consulting mechanical engineer, succeeding P. E. Gourdon, who has retired. Ritchings, associated with Ebasco since 1937, progressively has held various positions including assistant mechanical engineer on power plant construction, job engineer responsible for mechanical design of steam electric stations, project engineer, and group supervisor responsible

for supervision of all design for various steam electric stations.



RITCHINGS

PINKSTON

John T. Pinkston, an authority in the chemical process field, has been named to the newly created position of process consultant of United Engineers & Constructors, Inc., Philadelphia. Pinkston, formerly manager of process at Catalytic Construction Company, will be in charge of process development activity for the firm.

Lee J. Narver will assume the position of senior vice president in

addition to his duties as chairman of the board of Holmes and Narver, Inc., Los Angeles, California.

William Tenney has been transferred from Dames and Moore's general office staff to the San Francisco office as project manager.

M. J. Shelton, Deputy Director of the California State Department of Water Resources from 1956 to 1959, has joined Koebig and Koebig, engineering firm of Los Angeles, as chief engineer of the firm's new offices at 615 Broadway, San Diego, California.

David Levine, landscape architect and architect, a partner in the firm of John J. Kassner & Co., consulting engineers of New York City, has been sworn in by Mayor Robert F. Wagner for a three-year term as the landscape architect member of the Art Commission of the City of New York.

Burton P. Harrison, Jr., formerly associated with Giffels & Vallet and Giffels & Rossetti as a project manager, has joined the consulting engineering firm of John G. Hoad & Associates, Inc., of Ypsilanti, Michigan, in the capacity of chief staff engineer.

Lester L. Bosch, partner in the Cincinnati consulting engineering firm of Bosch and LaTour, has received The Technical and Scientific Societies Council of Cincinnati's Engineer of the Year Award for his achievements as a practicing professional engineer.

Announcement has been made of the election of Coleman R. Sample, vice president, as a director of Ford, Bacon & Davis, Inc. and Ford, Bacon & Davis Construction Corporation, engineers and business consultants, New York.

The firm also announced the election of George O. Phillips, vice president, as a director of Ford, Bacon & Davis Canada Limited,

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See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File



47 Tons of Roebling Guys Keep TV Tower in Clear View of 2,464,500 People

The grand, new (1526 ft) WIS-TV transmitting tower in Columbia, South Carolina is, among other things, the fourth tallest man-made structure in the world, with a built-in wind resistance up to 145 miles per hour. This ethereal eminence means an increase of almost 100% in the number of WIS-TV's potential viewers.

Maintaining the tower's sway (both literally and figuratively) over the South Carolina market are six sets of Roebling prestretched galvanized bridge strand. Each set consists of varying lengths of prestretched strand: six pieces of 1-5/16" strand at lengths ranging from 705 to 1022 ft, three pieces of 1-3/16" strand of 826, 837 and 858 ft, respectively, three pieces of 1 1/4" strand in lengths of 1489, 1492 and 1473 ft and six pieces of 1 1/2" diameter from 1662 ft to 1835 ft.

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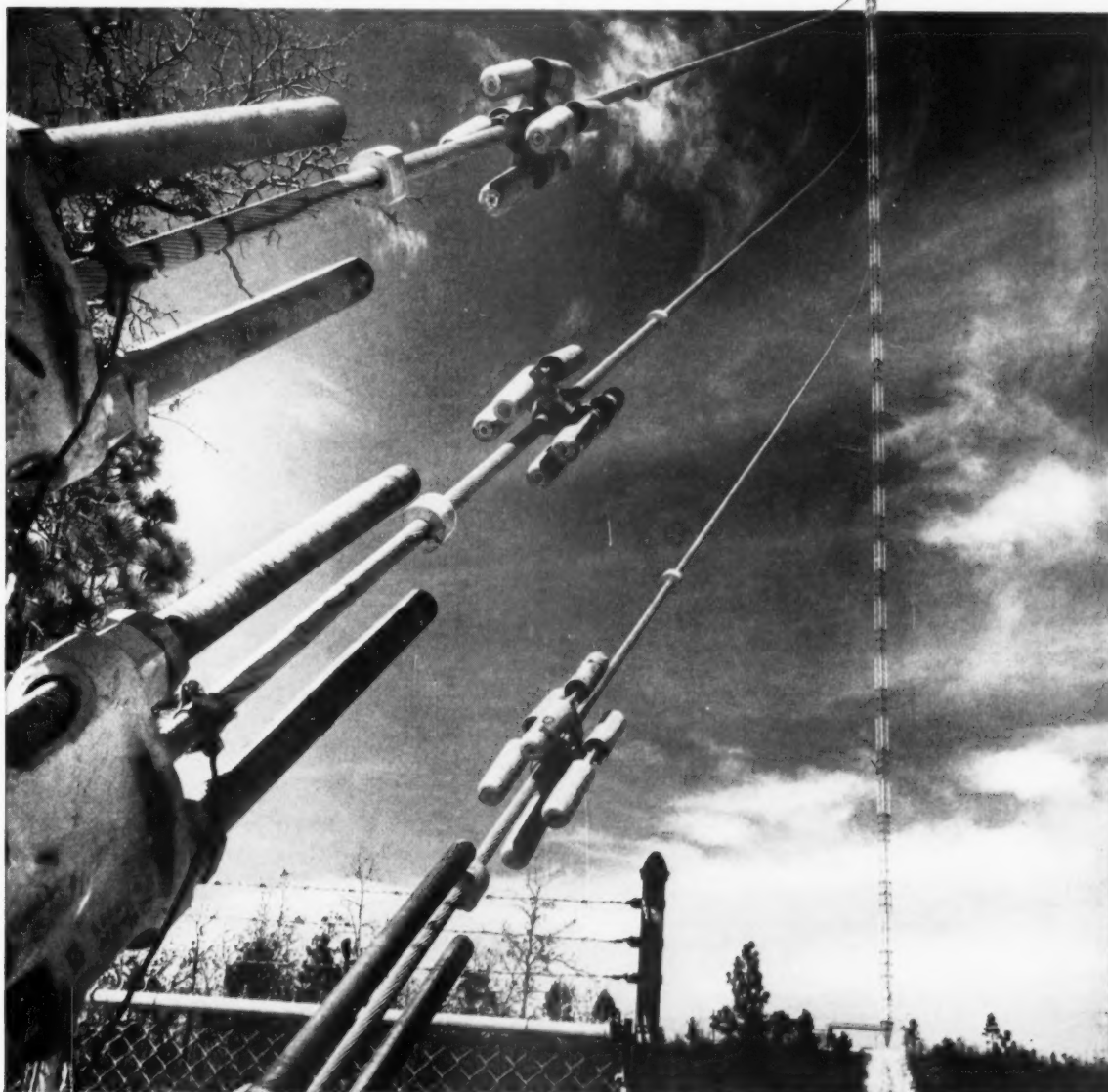
highest man-made structure in the world, you will need guys to keep it eminently erect. That is the time to call on Roebling and enlist the aid and facilities of the authority on suspension systems in this, or any other country. This includes bridges, tramways, ski lifts, materials handling, suspended roofs and, as you already know, new heights in market power.

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WIS-TV Tower in Columbia, South Carolina, 1526 feet tall, designed, fabricated and erected by Kline Iron & Steel Company, Columbia, South Carolina.

and the retirement of David A. Uebelacker as vice president of Ford, Bacon, & Davis, Inc., and senior vice president of Ford, Bacon & Davis Canada Limited. Uebelacker continues as a director of the two companies and of Ford, Bacon & Davis Construction Co.

New address of Ford, Bacon & Davis, Inc. is 2 Broadway, New York, N. Y.

S. B. Barnes, S. B. Barnes and Associates, Los Angeles, has been elected 1959 president of the California Board of Registration for Civil and Professional Engineers. Claire A. Hill, Redding, was appointed to the Board by retiring Governor Knight.

Jack Russell Rummel has been appointed project director of the Industrial and Military Division of Daniel, Mann, Johnson & Mendenhall, Architects & Engineers, Los Angeles, California. Rummel replaces Hans W. (Bill) Meier, who

will depart for the Mediterranean area and will manage DMJM's southern European office. Affiliated with DMJM for the past 3½ years, Rummel formerly was project manager in charge of the DMJM office for Guam, M.I.



RUMMEL

STOFKO

John T. Stofko has been appointed vice president and director of administration of Charles Luckman Associates, architectural-engineering and planning firm. Stofko has been associated with the firm for several years, and until recently served as director of engineering of

the New York offices. In his new position, Stofko will be responsible for administration of finances, budgets, cost control, and engineering subcontracts.

At the annual meeting of the Missouri Association of Consulting Engineers, the following officers were elected for 1959: president, E. F. Thatcher; vice president, W. F. Rath; treasurer, C. J. R. McClure; and secretary, B. F. Friberg. Prominent consulting engineers elected to three-year terms as directors of the Association are: J. D. Falvey, F. E. Wenger, A. F. Helmkamp, H. M. Smith, L. L. Hamig, and Joe Williamson, Jr.

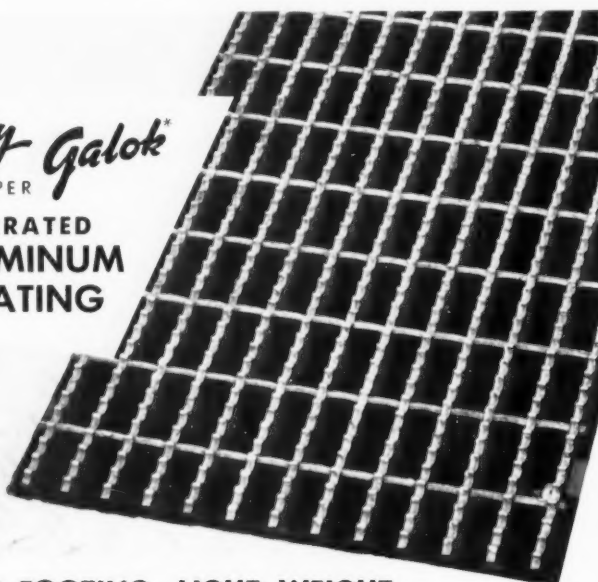
O. W. Kayser and Peter H. Smith have been appointed assistant vice presidents of Gibbs & Hill, Inc., consulting engineers with principal offices in New York City. Kayser has been supervising project engineer in charge of railroads and electric transmission since 1957 and will continue this responsibility in his new position. Smith, chief project engineer of the firm, will continue to serve in this capacity as assistant vice president.

Edward A. Sobolewski has joined the consulting engineering firm of Fred S. Dubin Associates as associate in charge of the New York office. Sobolewski formerly headed his own consulting engineering firm in Cincinnati, Ohio.

William H. Wisely, executive secretary of the American Society of Civil Engineers, has been reappointed to the New York State Public Health Council by Governor Nelson Rockefeller. Wisely had held the post previously under Governor Averell Harriman. With the reappointment, Wisely will serve on the Health Council until January 1, 1965.

Stevens and Thompson, Portland, Oregon, has announced that Ray E. Charles has become a principal

Gary Galok*
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**SERRATED
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GRATING**



POSITIVE FOOTING, LIGHT WEIGHT

Serrations scientifically designed to provide maximum positive footing and traction. High strength to weight ratio, minimum deflection, maximum safety, corrosion resistant. Bars cannot turn, twist, loosen or fall out. Write for complete details. Bulletin CE-59

*Patents Pending

Gary SUPER Galok aluminum grating also available with plain bars. Both the serrated and plain types in sizes for every need.



ROCKWELL-STANDARD
CORPORATION
GRATING DIVISION
4015 E. Seventh Ave., Gary, Indiana

how the *Peer* is put in *Peerless Electric*®

• Large scrolls are given minute attention to insure sturdy construction. Tolerances are left close for maximum performance. Scrolls are completely arc welded, making an air-tight housing over and around the finished unit. All welds and joints are carefully cleaned and smoothed prior to painting. A well equipped, large-blower fabrication section handles all this work.

WRITE TODAY FOR CATALOGS!

FAN AND BLOWER DIVISION

THE *Peerless Electric*® COMPANY

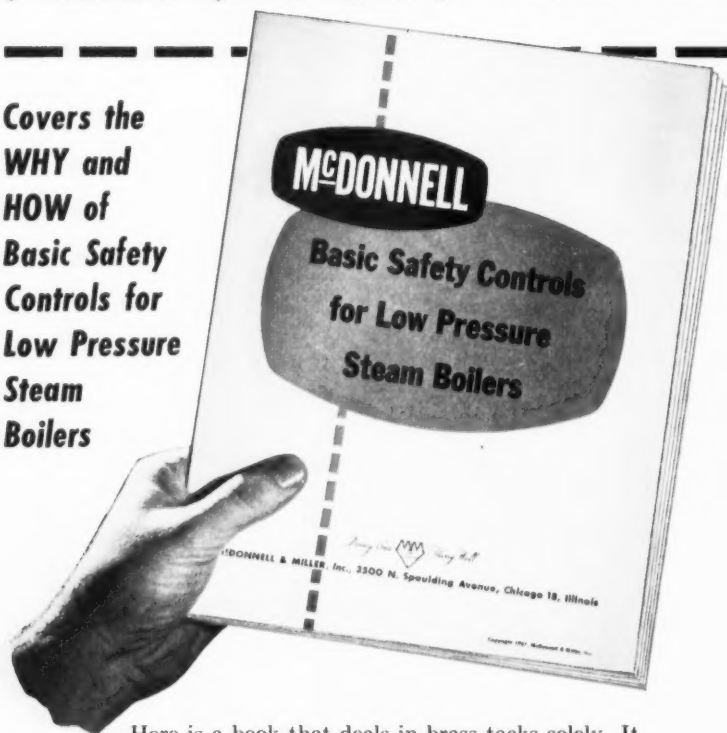
Also Manufacturing The Massachusetts Line®
WARREN, OHIO

Member of the Air Moving and Conditioning Association, Inc. (AMCA)



NEW BOOK THAT CAN DO A JOB FOR YOU!

Covers the
**WHY and
HOW of
Basic Safety
Controls for
Low Pressure
Steam
Boilers**



Here is a book that deals in brass tacks solely. It tells its story in simple diagrams and equally simple explanation that wastes no words on product description. It sticks to fundamentals and concrete recommendations that answer practically all safety control problems encountered in the low pressure steam field. So well classified and indexed are the facts that, whatever your job, you can turn right to the most authentic way of handling it: The right product ... the correct hook-up ... the proper wiring. Use the coupon to request your copy, and if you do not have the earlier "hot water" booklet, request it too.

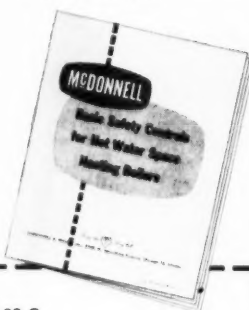
This new "Low Pressure Steam" booklet was inspired by the widely praised booklet on "Hot Water Boilers." These two companion-pieces can do a real job for you.

McDONNELL & MILLER, Inc.,
3500D N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

McDONNELL

Boiler Water Feeders • Low Water Fuel Cut-Offs • Pump Controllers • Flow Switches • Relief Valves • Related Liquid Controls for Tanks, Stills, Air Conditioning Systems



- ☐ Send me your new STEAM Booklet L-711
☐ Send me your new companion HOT WATER Booklet P-30-C

Company Name _____

Street Address _____

City Zone & State _____

By _____

Mail to: McDonnell & Miller, Inc., 3500D N. Spaulding Ave., Chicago 18, Ill.

of the firm and will be a resident partner in Seattle, Washington. Charles formerly was with the Alaska District, U. S. Army Corps of Engineers.

The consulting firm of Marc Shio-witz and Associates, Inc., Gardena, California, has appointed Earl Kanter to manage its contracts relating to airborne computers and inertial guidance systems. Before joining Marc Shio-witz and Associates, Kanter was in charge of preliminary design for the Electronics Division of the National Cash Register Company.

James V. Roy has been appointed sales manager of Singmaster & Breyer, Inc., New York chemical and metallurgical engineering affiliate of the Fluor Corporation, Ltd. of Los Angeles.

John J. Mahoney and Frank L. Cioffi, consulting engineers, have opened a new office at the St. Regis Building, 34 Park Place, Newark, New Jersey. Formerly located in New York City, they will continue their activities in the mechanical, structural, and chemical phases of engineering in addition to providing construction supervision.



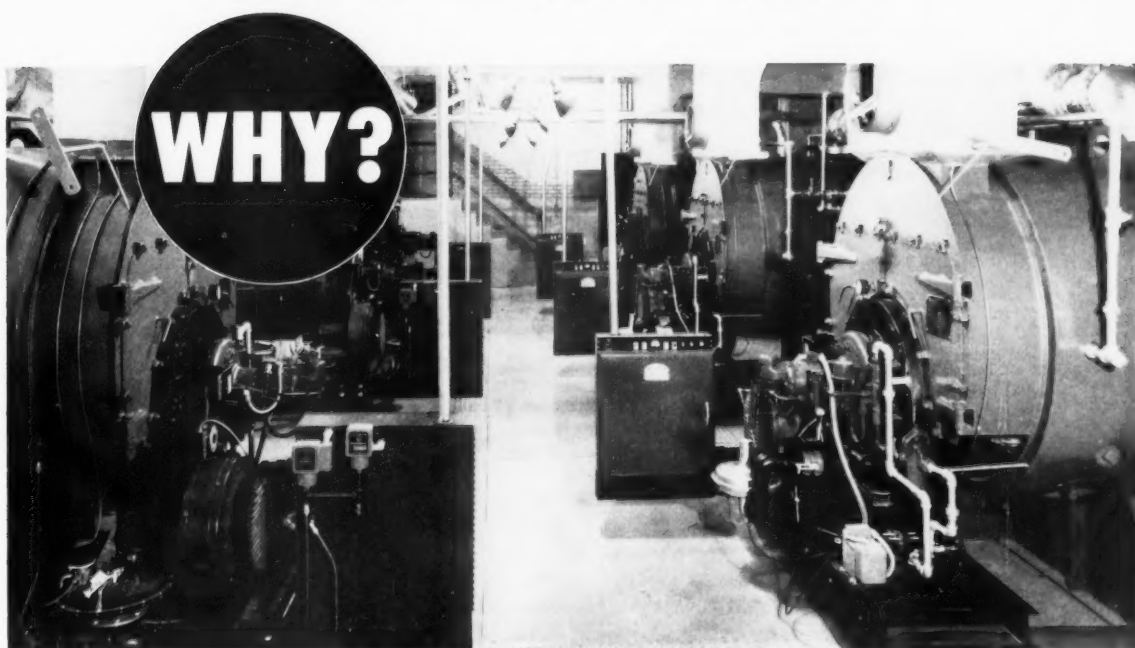
MAHONEY



ROSENLUND

Jack E. Rosenlund, chief structural engineer of George L. Dahl, Architects & Engineers, Dallas, was awarded a bronze plaque by the American Concrete Institute at its annual convention in Los Angeles. The plaque was presented to Rosenlund for his published treatise on details and problems of

3 big boilers replaced by 6 small boiler-burner units



Six Petro package units replaced three big boilers in the Masonic Temple, Dayton, Ohio. Consulting Engineer—Schweiger, Heady and Associates, Dayton; Heating Contractor—Reiniger Plumbing & Heating Co., Dayton; Petro Distributor—Southmayd-Rankin Co., Dayton.

Advantages of Petro small package firing

Avoids wasteful use of boiler capacity

Outdoor thermostats put additional boilers "on the line" one at a time—or take them off—according to weather changes. These Petro units not only save fuel, but (quoting Mr. William C. Simpson, Executive Manager of the Masonic Temple Association of Dayton). "We do not have the extremes in building temperatures which were formerly experienced."

Fuel automatically selected by weather

Petro firing units automatically switch from gas to oil when outdoor temperature falls to 20 degrees. This relieves the gas lines of an extra load during periods of peak demand, and a lower gas rate is frequently given by the utility in such cases. Gas firing is automatically resumed as temperature rises. With full automatic control only minimum supervision is necessary.

No stack needed

Petro forced draft firing units eliminate high stacks. In fact, the only flue connection necessary is to a simple vent for the spent products of combustion.

DEPENDABLE Petro firing

Petro engineering stresses simple, non-temperamental design and rugged construction. These qualities, consistent for over half a century, have made Petro famous for thorough dependability.

Mail this coupon for more information

PETRO

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Makers of quality heating and power equipment since 1903

PETRO
3320 West 106th Street, Cleveland 11, Ohio
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Please send me literature and specifications on the money-saving Petro Package Unit.

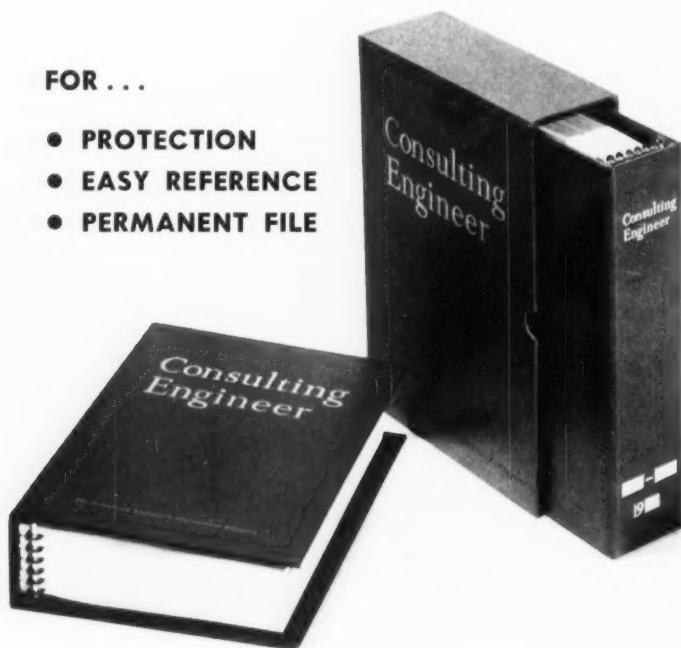
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Company _____
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Binder and slip case	\$4.50
Binder only (holds 6 issues)	\$3.00

Attractive addition to firm library or executive office.

Consulting Engineer

Wayne near Pleasant St. • St. Joseph, Michigan

forming the columns, cantilevers, and roof sections as well as general considerations governing the structural design of the Dallas Memorial Auditorium.

Nielsen and Bruch, consulting engineering firm of Minneapolis, Minnesota, has changed its name to Bruch, Morrow and Knafla, Inc. Principals of the new firm are Wallace C. Bruch, G. Leigh Morrow,



MORROW

KNAFLA

and Norman K. Knafla. Knafla recently resigned as chief electrical engineer of the architectural-engineering firm of Magney, Tusler and Setter. Firm address is 1645 Hennepin Avenue, Minneapolis.

Stanley A. Kroll has resigned as vice president of Taller & Cooper, Inc. and has opened his own consulting engineering office at 315 Gold Street, Brooklyn, New York. Kroll has been engaged in the design and planning of toll plazas and revenue collection systems for the past 30 years and plans to extend his practice to all phases of electrical engineering and the design of special devices for applications in revenue control and related fields.

Wilfred Henschel, P. E., has resigned from the engineering department of the Port of New York Authority and is available for consulting and design services on electrical installations for tunnels, bridges, airports, highways, industrial plants, warehouses, and commercial and institutional buildings. Henschel's office is located at 475 Fifth Avenue, New York. ▲▲

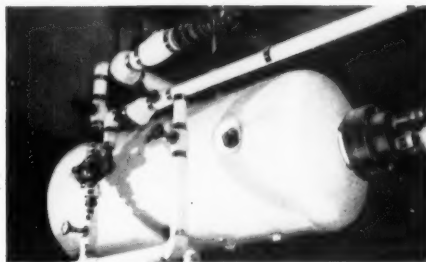
when special service is needed . . .

Specify RECO



To be opened in Fall of 1959 • The Sinai Hospital, a new \$19,000,000, 423 bed, seven building Medical Center in Baltimore, Md.
 Architect—Voorhees, Walker, Smith, Smith and Haines • General Contractor—Turner Construction Co. • Mechanical Contractor—Lloyd E. Mitchell, Inc. • RECO Representative—Lancaster, May & Co.

RECO GENERATORS PRESCRIBED FOR NEW MEDICAL CENTER



Inside hospital operating rooms, temperature and humidity must remain constant.

At new Sinai Hospital the job is done by steam. Steam generated by 3 RECO steam generators, which supply steam to humidifiers for the control of relative humidity in more than 16 operating rooms.

Today in hundreds of hospitals throughout the United States, the RECO full line

of corrosion-resistant copper-silicon and copper-lined tanks and hot water heat exchangers are on the job with round-the-clock dependability. On your next hospital and other hot water jobs *specify RECO*.

There is a RECO representative near you . . . call on him for complete data. Or write us today. Address RECO, Dept. C, 7th and Hospital Sts., Richmond 5, Va.

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RICHMOND ENGINEERING CO., INC.

USS Tiger Brand—America's

—used on Niagara Power Project—

Niagara Falls is the greatest, single natural source of water power in North America. Soon it will be harnessed by the New York State Power Authority to produce 2,190,000 kilowatts of electricity. This is 216,000 more kilowatts than is generated at Grand Coulee Dam, the Free World's No. 1 manufacturer of hydroelectric power.

Water now tumbles over the falls at a rate of 200,000 cubic feet per second. To make use of some of this, two huge intake structures on the Niagara River above the falls will draw water into the power system. (See Map.) This water will pass

through about 22,000 feet of twin, covered concrete conduits, feeding into a huge reservoir with a storage capacity of some 20 billion gallons. From the reservoir the water will flow by gravity to an 1840-foot-long power plant built at the base of a 314-foot rock cliff on the Niagara River, below the falls. Here, 13 huge turbine-generators will turn out 1,950,000 kilowatts of electricity. An additional source of power will be the smaller pump-generator station at the reservoir, generating up to 240,000 kilowatts. Shovels and bulldozers rigged with USS Tiger Brand Wire Rope are busy



No. 1 Wire Rope

biggest in the country

chewing away the rocky cliff to make room for the power house.

Why Tiger Brand is your best buy

1. It is made by a company that maintains the most complete wire rope research and manufacturing facilities in the country.
2. It is designed by one of the country's largest staffs of wire rope engineers. It is serviced by thoroughly experienced field representatives always ready with their assistance.
3. Every type of Tiger Brand Wire Rope is designed for specific applications. You get the *right* rope for the job.
4. It is made by *one* company, U. S. Steel, and every step of production, from ore to finished product, is carefully controlled and supervised to guarantee *one* high standard of quality.

5. Tiger Brand Wire Rope is manufactured by the largest single producer in the country.

For complete information, write to American Steel & Wire, Dept. 920, 614 Superior Avenue, N.W., Cleveland 13, Ohio.

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Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad



◀ **Ripping rock**—USS Tiger Brand Wire Rope is used throughout this shovel and on many of the other draglines, cranes and bulldozers digging the excavation for the main power plant.

Engineering Consultants:
Uhl, Hall and Rich—Boston

General Contractors:

Merritt Chapman & Scott—
\$98,288,498 Niagara Power Plant and
\$65,692,254 Niagara River Intake Works,
plus 6600-foot section of the waterway.

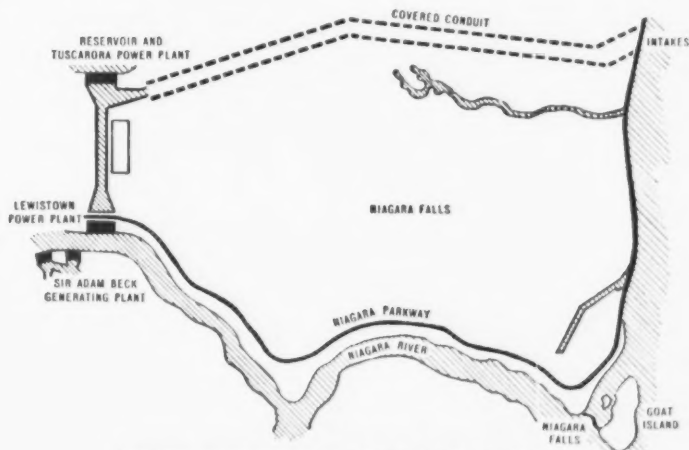
Balf-Savin-Winkelman—
\$37,366,805 Section II of the waterway.

Gull-Defelice—
\$29,861,840 Section III of the waterway.

Tuscarora Contractors—
Combine of Arundel Corporation, Sponsor:
L. E. Dixon Company,
Hunkin-Conkey Construction Company,
\$39,834,292 Tuscarora Power Plant.

Channel Constructors—
Peter Kiewit, Sponsor
Perini Corporation
Morrison-Knudsen
Walsh Construction Company
\$31,855,000 Section IV of the waterway,
plus Aggregate Plant.

Main generating plant of the Niagara Falls Power Project, one of the world's largest, will produce 1,950,000 kilowatts of electricity.

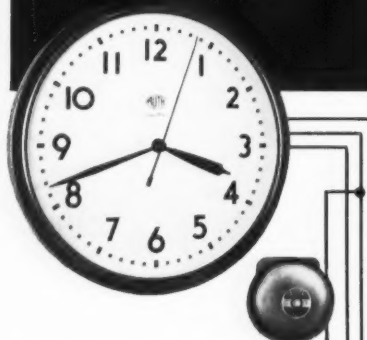


Project map—showing how water will be conducted through closed conduits from intake above the falls to storage reservoir and then to the main power house below the falls. The two power plants will generate 219 million kilowatts of electricity—enough for the household needs of a city the size of Chicago.

Simplify
**SPECIFICATION...
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**CLOCK and Program
 SYSTEMS**



AUTH Clock Systems feature Telechron-motored, self-starting synchronous movements. They operate directly on ever-accurate alternating current supplied by the central power station, without the use of master clocks, relays, rectifiers or other auxiliary devices.

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Please send booklet on AUTH Centrally Controlled Clock and Program Systems.

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 Company _____
 Address _____
 City _____ State _____



New Projects Reported

By Consulting Engineers

ALABAMA

Dwyer & Kite

Kansas City, Missouri

¶ Poultry feed plant, Jasper, Alabama. (struc.) \$400,000 (est.). Client, Pillsbury Mills, Inc., Clinton, Iowa.

CALIFORNIA

John R. Anderson, Structural Engineer

Pasadena, California

¶ Concrete block warehouse, 10,800 sq ft, wood rafters, tapered steel girders, plywood sheathing, and composition roofing, Twenty-Nine Palms, Calif. (civil, struc.) \$50,000. Client, Lyons Furniture Co., John L. Lyons, owner.

¶ Precast concrete tilt-up office and warehouse buildings, 14,400 sq ft, for Lingle Bros. Coffee Co. Wood rafters, tapered steel roof girders, plywood sheathing, and gravel roofing. (civil, struc.) \$70,000. Client, Donald F. Shaw, contractor.

Albert Zimmerman

Los Angeles, California

¶ Antelope Valley College, Antelope Valley, Calif. (mech.) \$6 million. Client, H. L. Gogerty, architect.

Mackintosh & Mackintosh

Los Angeles, California

¶ Medical building. (struc.) \$500,000. Client, Sam Reishord, architect.

¶ Office building. (struc.) \$2.5 million. Client, Sidney Eisenshtat & Associates, architects, and S. Jon Kreedman & Co., contractors.

CONNECTICUT

Carl Gesund

Hamden, Connecticut

¶ Chase elementary school, Waterbury, Conn. (struc.) \$200,000. Client, arch.

¶ John G. Gilmartin elementary school, Waterbury, Conn. (struc.) \$350,000. Client, architect.

¶ Hospital addition, Mansfield State

Training School, Mansfield, Conn. (struc.) \$670,000. Client, architect.

¶ Synagogue with social hall and classrooms, New Haven, Conn. (struc.) \$350,000. Client, architect.

¶ Church addition, West Haven, Conn. (struc.) \$200,000. Client, architect.

¶ Library addition, West Haven, Conn. (struc.) \$220,000. Client, architect.

¶ Addition, Jewish center, New Haven, Conn. (struc.) \$200,000. Client, arch.

Bogert & Childs

New York, New York

¶ Addition to existing incinerator plant, Stamford, Conn. (civil, struc., mech., elec.) \$400,000. Client, City of Stamford, Connecticut.

FLORIDA

Brockway, Weber & Brockway

West Palm Beach, Florida

¶ Nicholas Fornaby subdivision, Palm Beach County, Florida. Earthwork, paving and drainage, water distribution, and sanitary sewage collection and treatment. (civil, struc., mech., elec.) \$630,000. Client, Nicholas Fornaby.

¶ Forest Hill Village, Palm Beach County, Fla. Earthwork, paving and drainage, water distribution, and sanitary sewage collection and treatment. (civil, struc., mech., elec.) \$2,160,000. Client, Forest Hill Village, Inc.

¶ Palm Beach Garden Estates, Palm Beach County, Fla. Earthwork, paving and drainage, water distribution, and sanitary sewage collection. (civil) \$355,000. Client, Bankers Life & Casualty Co.

¶ Palm Beach Isles, Palm Beach County, Fla. Hydraulic fill, paving and drainage, bulkhead, and water distribution. (civil, struc.) \$675,000. Client, Pelican Corp.

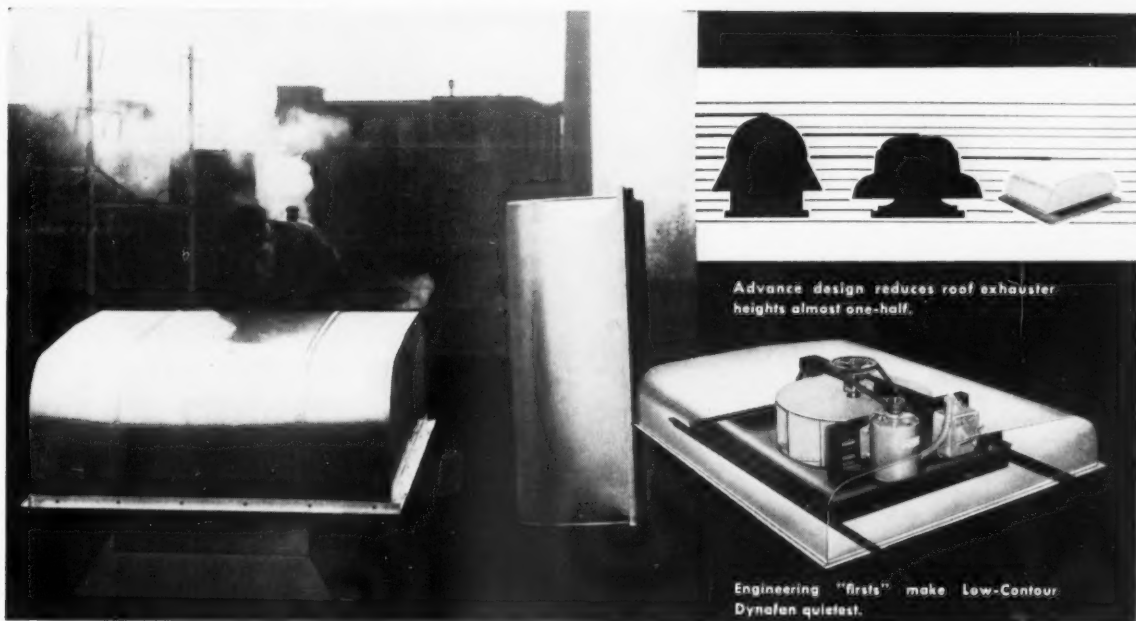
¶ Beau Rivage, St. Lucie, and Martin Counties, Fla. Earthwork, paving and drainage, water supply and distribution. (civil) \$450,000. Client, A. J. Cosmetto.

¶ Ranch Estates, Palm Beach County, Fla. 2000-home subdivision land plan-

LOW...

AND

QUIET



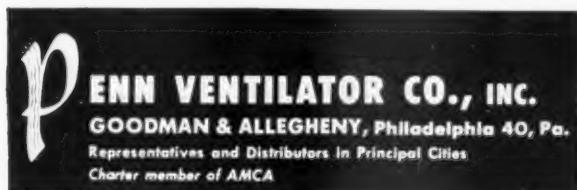
Advance design reduces roof exhauster heights almost one-half.

Engineering "firsts" make Low-Contour Dynafan quietest.

Penn Ventilator's new Low-Contour Dynafan hugs the roofline . . . hardly makes a sound. It's engineered specifically to run quietly. This new unit is your assurance that clean lines designed into modern buildings won't be compromised. Many engineering advances have been incorporated in the Low-Contour Dynafan. For example:

- motor isn't atop the wheel as in most roof exhausters
- there's no vibration-prone overhung shaft
- noise is cut appreciably by straddling
- fan wheels are supported between sealed ball bearings—above and below wheels
- entire fan floats on vibra-sorb vibration eliminators
- exact type motor to fit each particular service condition

Get all the details. Call your Penn Ventilator man or write to Penn Ventilator, Philadelphia.



MERCOID® MERCURY SWITCH RELAYS



**FOR
VOLTAGES
TO 440
ac or dc**

**NO SPRINGS
OR CLAPPERS**

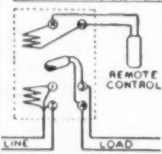
**NO WELDING OF CONTACTS
NO MAINTENANCE REQUIRED**

The operation of a Mercoid Transformer-Relay has several advantages over clapper type relays. In principle, it is a low voltage transformer—the two coils of which, operate as a repulsion relay.

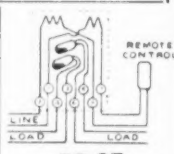
The primary coil is fixed in position and connected across the high voltage line. The secondary coil is movable and is connected to the control circuit.

When the control circuit is closed, the secondary coil instantly moves upward by repulsion action, thereby operating the hermetically sealed mercury contact. When the control circuit opens, the secondary coil drops by gravity restoring the mercury contact to its original position.

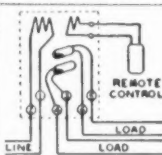
Hundreds of circuit arrangements are available—a few typical examples are shown below:



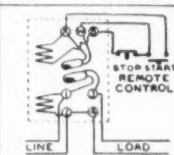
**SP-ST
ac**



**DP-ST
dc**



**SP-DT
ac**

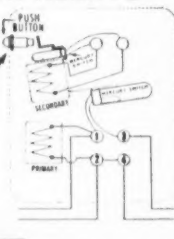


**SP-ST ac
start-stop**

PUSH BUTTON RELAYS

Available for various circuit arrangements.

Push button to open circuit when relay is energized (circuit will automatically close when relay is de-energized.)



WRITE FOR BULLETIN NO. 31

**THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.**

ning, paving and drainage, water supply and distribution, and sewage collection and treatment. (civil, struc., mech., elec.) \$2.4 million. Client, Ranch Estates, Inc.

† Edgewater Park-Bahama Heights, Palm Beach County, Fla. Earthwork, paving and drainage, water distribution, and sanitary sewage collection. (civil, struc.) \$255,000. Client, Brown & Cushman.

† Town of Manalapan, Fla. Water supply, storage, and transmission main. (civil, struc., mech., elec.) \$150,000. Client, Town of Manalapan.

† City of Delray Beach, Fla. Sewage collection, transmission, and treatment. (civil, struc., mech., elec.) \$600,000. Client, Riviera Beach Sewer Co.

† Lake Belvedere Estates, Palm Beach County, Fla. Earthwork, paving and drainage, water distribution, and water treatment. (civil, struc., mech., elec.) \$325,000. Client, Lake Belvedere Estates.

† Palm Beach-Lake Worth Estates, Palm Beach County, Fla. Hydraulic fill, paving and drainage, water distribution, and sanitary sewage collection. (civil) \$450,000. Client, Bankers Life & Casualty Co.

Jas. Gamble Rogers, Lovelock & Fritz
Winter Park Florida

† First National Bank building, Eau Gallie, Florida. (arch., civil, struc., mech., elec.) \$300,000. Client, First National Bank.

† Commercial Bank building, Ft. Pierce, Florida. (arch., struc., civil, mech., elec.) \$180,000. Client, Commercial Bank.

† Cooperative apartment group, eight 4-story buildings, Winter Park, Fla. (arch., civil, struc., mech., elec.) \$1.5 million. Client, Mayell, Gurney & Kafer.

† St. Lucie County courthouse, Ft. Pierce, Fla. New courthouse, four stories, 48,000 sq ft. (arch., civil, struc., mech., elec.) \$1 million. Client, Board of Commissioners, St. Lucie County, Fla.

† St. Lucie County jail, Ft. Pierce, Fla. New jail building. (arch., civil, struc., mech., elec.) \$400,000. Client, Board of Commissioners, St. Lucie County, Fla.

Rader and Associates
Miami, Florida

† Master plan and designs for the expansion of Hialeah Hospital from its present 140 beds to 250, including new kitchen and dining room, expanded surgical facilities, sewage treatment plant, and additional parking space. \$1.4 million (est.). Client, Hialeah Hospital.

† Architectural designs for four-story addition to Northwest Hospital, Miami, Florida, to expand present 45-bed capacity to eventual 270. \$1.5 million (est.). Client, Northwest Hospital.

† Engineering services for expansion of airport at Melbourne, Florida, including lengthening east-west runway by 3000 feet and north-south runway by 900 feet. Also includes taxiways, warm-up aprons, and lighting. \$200,000 (est.). Client, City of Melbourne, Fla.

† Engineering services relative to utilization of 38 acres adjacent to new terminal building at Miami International Airport. Initial topographic survey, de-

sign of concrete turn-around maintenance apron on part of area, with master grading plan for the rest. \$200,000 (est. cost of apron). Client, Eastern Air Lines, Miami, Florida.

HAWAII

Montgomery & Kohloss
Honolulu, Hawaii

† Waialeale experimental farm, agricultural experiment station, University of Hawaii, Waialeale, Oahu. (mech.) \$50,000. Client, George Vincent Hogan, architect.

† Air conditioning system for new building, Honolulu. (mech.) \$20,000. Client, Caspro, Ltd.

† Medical building for The Maui Clinic, Kahului, Maui. (mech.) \$35,000. Client, Lemmon, Freeth, Haines & Jones, arch.

Belt, Lemmon and Lo
Honolulu, Hawaii

† 156-unit housing project, Punchbowl, Honolulu. (civil, struc., mech., elec.) \$1.5 million. Client, Hawaii Housing Authority.

† 866-unit housing project (Capehart), Schofield Barracks and Fort Shafter, Oahu. (civil, struc., mech., elec.) \$12 million. Client, U.S. Army, Honolulu Engineer District.

† Ewa Beach high school, Ewa Beach, Oahu. (civil, struc., mech., elec.) \$1 million. Client, City and County of Honolulu, Hawaii.

ILLINOIS

Thomas J. Higgins Associates, Inc.
Chicago, Illinois

† Processing plant, Chicago, Ill. Includes three feeders, four belt conveyors, one screen, four screw conveyors, lime bin, lime silo, pug mill, and concrete hoppers. Structural steel structure. (civil, struc., mech., elec.) \$150,000. Client, Pozzolan Products Co.

† New church for Maternity BVM parish. Seating capacity, 1200. Preliminary sketches only. Client, Catholic Bishop of Chicago.

Russell and Axon
St. Louis, Missouri

† Sewage plant additions. (struc., civil, mech., elec.) \$300,000. Client, Belleville, Illinois.

† Sewage plant. (civil) \$350,000. Client, City of Wood River, Illinois.

Wight & Company
Downers Grove, Illinois

† Water system. (civil) \$650,000. Client, Village of Oakbrook, Illinois.

† Sewage disposal system. (civil) \$700,000. Client, Village of Oakbrook, Illinois.

IOWA

E. H. Pietsch Engineering Company
Des Moines, Iowa

† Charles City high school, Charles City, Iowa. (mech., elec.) \$1.5 million. Client, The Griffith Co., architects.

† Post office and courthouse, Fort Dodge,

Curtis

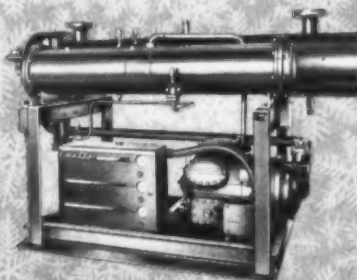
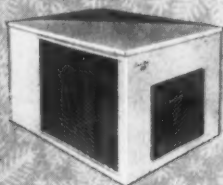
CONDITIONS COMMERCIAL AMERICA...



Curtis packaged units minimize floor area required. Factory assembled and tested. Field installation requires only setting and connecting utilities.

PACKAGED AIR CONDITIONERS UP TO 100 TONS.

AIR-COOLED UNITS UP TO 10 TONS.



PACKAGED LIQUID CHILLERS UP TO 100 TONS.

P R E C I S I O N

close tolerance manufacturing, builds peak performance into every CURTIS unit.

Curtis is the "luxury line" in the air-conditioning industry. Silence, efficiency and long-life are inherent in Curtis' design. Yet Curtis prices are right in line.

This is why Curtis designs and builds thousands of unique air conditioning systems for commercial America . . . why Curtis is able to maintain a family of over 300 representatives and servicing contractors across the nation.

Put the advantages of CURTIS PRECISION into your next job.



Curtis

MANUFACTURING COMPANY
REFRIGERATION DIVISION

OUR 105th YEAR

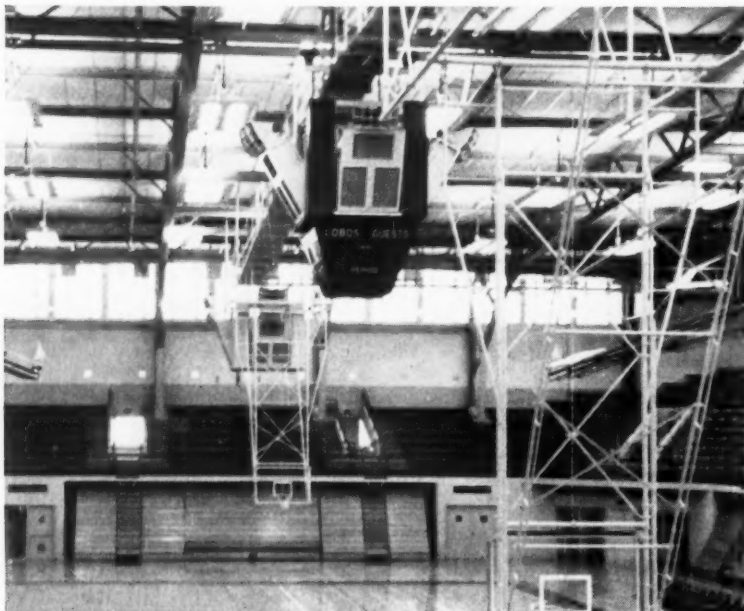
WRITE DEPT. 3, ST. LOUIS 20, MISSOURI

THE CURTIS "LUXURY LINE" OF AIR CONDITIONERS COSTS NO MORE

STROMBERG-CARLSON

congratulates...

- The University of New Mexico
- Architects Meem, Holien, Buckley & Associates
- Acoustical Engineers Bolt, Beranek & Newman



The new Roy Johnson Gymnasium, at the University of New Mexico, is outstanding both architecturally and functionally.

Its sound system not only meets the strictest requirements of audio quality, flexibility and dependability. It also evidences *ingenuity* on the part of both the planners and the purveyors, Stromberg-Carlson.

Voice transmission of high intelligibility and full-range music distribution make every seat "front row." In addition, certain problems peculiar to the location's purposes were met in an ingenious manner.

For example, two separate sound systems serve the glass-enclosed pool

area. Spectators listen to the splash of swimmers and divers, and the athletes themselves are inspired by the full reception of the crowd's noisy encouragement.

It would take pages to provide a full, detailed description. We'd welcome the opportunity to describe this whole outstanding system.

Our field engineers will be glad to consult with you on any project. Our factory-trained distributing organization is ready to handle all installation and maintenance problems. You'll find their names in the Yellow Pages under the heading titled: "Public Address and Sound Systems."

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SPECIAL PRODUCTS DIVISION • ELECTRONICS CENTER
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Electronic and communication products for home, industry and defense

Iowa. (mech., elec.) \$1,980,000. Client, The Griffith Co., architects.

KANSAS

Uri Seiden and Associates

Kansas City, Missouri

† Rosalia school, steel framing, one-story, Rosalia, Kansas. (struc.) \$150,000. Client, Associated Architects of Kansas City.

† Warehouse building, 20,000 sq ft, steel frame, masonry walls, Kansas City, Kansas. (struc.) \$100,000. Client, Glazer-Kaufman Co.

† Fairgrounds School District No. 4, one-story steel construction, Atchison, Kansas. (struc.) \$100,000. Client, Frangkiser & Hutchens, architects.

KENTUCKY

E. R. Ronald & Associates

Louisville, Kentucky

† Complete new heating plant for Ormsby Village childrens' home, Louisville, Ky. (mech., elec.) \$250,000. Client, Louisville & Jefferson County Childrens' Home.

† Research building, University of Louisville, Louisville, Ky. (mech., elec.) \$2.5 million. Client, Joseph and Joseph, arch.

† Dormitory for 200 men, University of Louisville, Louisville, Ky. (mech., elec.) \$500,000. Client, Hartsten, Louis & Henry, architects.

† Jewish hospital, Louisville, Ky. Addition of two floors and air conditioning of all six floors. (mech., elec.) \$1.5 million. Client, Joseph and Joseph, architects.

† Angeli Merici high school, Ursuline Sisters, Louisville, Ky. (mech., elec.) \$1 million. Client, Wagner and Potts, architects.

MARYLAND

Alexander E. Forrest

Baltimore, Maryland

† Peninsula General Hospital addition, Salisbury, Maryland. (struc.) \$1.5 million. Client, James R. Edmunds, Jr., arch.

MASSACHUSETTS

J. E. York

Harwich, Massachusetts

† Air conditioning, main post office building, Springfield, Mass. (mech.) \$350,000 (est.). Client, U.S. Government, General Services Administration.

Gilbert Associates, Inc.

Reading, Pennsylvania

† Addition to municipal power plant. (civil, struc., mech., elec.). Client, City of Bainbridge, Mass.

† Beebe Station. Unit No. 12. (civil, struc., mech., elec.). Client, Rochester Gas & Electric Corp.

Joseph L. Paley

Boston, Massachusetts

† PHA housing project, 150 low rent units with community building, including site work, utilities, recreation facilities. (arch., civil, struc., mech., elec.) \$2

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Connor's research and 25 years of practical experience has resulted in ever-increasing efficiency in the recovery and purification of contaminated air for re-use in air conditioning systems.

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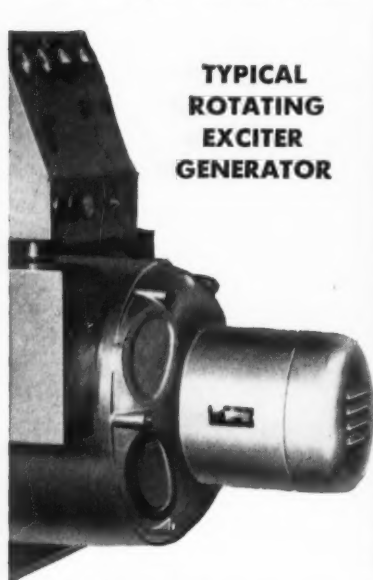
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ENGINEERING CORPORATION
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air recovery

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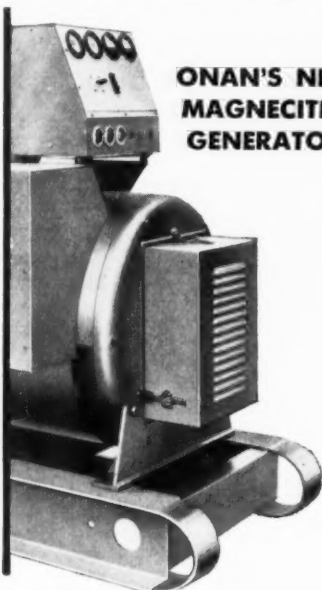
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on large Onan gasoline and diesel plants



**TYPICAL
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EXCITER
GENERATOR**



**ONAN'S NEW
MAGNECITER
GENERATOR**

*Eliminates all moving parts
in exciter and voltage regulator*

**Steps up performance in primary
and emergency standby installations**

- ✓ **FASTER VOLTAGE RECOVERY**—Rated voltage is restored within one second after load is applied or removed, compared with 5 seconds for a rotating exciter generator.
- ✓ **LESS VOLTAGE FLUCTUATION**—Voltage fluctuation with load changes is less than half that of standard-type generators.
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- ✓ **EASIER SERVICING**—All exciter and regulator components are easily accessible. No dismantling necessary.

New MagneCiter generators are now standard equipment on all Onan Electric Plants of 100, 125, 150, 175 and 200KW, as well as on many smaller sizes. A choice of Diesel or gasoline engine power is available on most MagneCiter-equipped models. Complete specifications on any or all Onan units will be sent on request.



Onan builds a complete line. Air-cooled gasoline models from 500 to 10,000 watts; air-cooled Diesels in 3 and 5KW; water-cooled gasoline models from 10 to 150 KW; water-cooled Diesels, 10 to 200KW. Also separate generators, D.C. plants, and accessories.

Call the Onan distributor listed in your
telephone book or write directly to us.

D. W. ONAN & SONS INC.

2655 University Ave. S.E., Minneapolis 14, Minnesota



million. Client, Chicopee Housing Authority, Chicopee, Massachusetts.

† Boiler plant and renovations to improve heating distribution system for Industrial School for Boys, Shirley, Mass. (arch., civil, struc., mech., elec.) \$350,000. Client, Commonwealth of Massachusetts Division of Building Construction.

MICHIGAN

E. Roger Hewitt Associates, Inc.
Lansing, Michigan

† New laundry, Sparrow Hospital, Lansing, Mich. (mech., elec.) \$125,000. Client, O. J. Munson.

† New additions to west wing, Sparrow Hospital, Lansing, Mich. (mech., elec.) \$1,250,000. Client, O. J. Munson.

† Dental office, Lansing, Mich. (mech., elec.) \$40,000. Client, C. V. Opdyke.

† Addition to Gunnisonville school, Dewitt, Mich. (mech., elec.) \$235,000. Client, Simpson & Hartwick.

† St. Girard Church, Lansing, Mich. (mech., elec.) \$200,000. Client, Mayotte & Webb.

† St. Mary School, Webberville, Mich. (mech., elec.) \$130,000. Client, Mayotte & Webb.

† Medical building, Kalamazoo, Mich. \$285,000. Client, Magnuson & Sumner.

† Medical building, Grand Rapids, Mich. \$170,000. Client, Magnuson & Sumner.

† Site drainage and street lighting, Everette high school, Lansing, Mich. (mech., elec.) \$110,000. Client, O. J. Munson.

† Field lighting and service building for Everette high school stadium, Lansing, Mich. (mech., elec.) \$145,000. Client, O. J. Munson.

Stuart D. Long
Grand Rapids, Michigan

† Interns' apartment building for Butterworth Hospital, Grand Rapids, Mich. (mech., elec.) \$350,000. Client, Roger Allen & Assoc.

† New student center building for Central Michigan College, Mt. Pleasant, Mich. Two-story structure of brick and stone, completely air conditioned. Center will have its own barber shop, bowling alley, and provisions for 3rd and 4th floors to be used as hotel rooms for guests. Center will have 80,000 sq ft of space and will feature a concrete dome 100 feet in diameter. (mech., elec.) \$2 million. Client, Roger Allen & Associates.

† Revisions to Munson Hospital, Traverse City, Mich. Laboratories and operating areas to be completely heated, ventilated, and air conditioned. (mech., elec.) \$600,000. Client, Harford Field & Assoc.

† New facilities for Comstock Park, classrooms, two shops, gymnasium and two locker room areas, cafeteria, and kitchen. (mech., elec.) \$650,000. Client, Roger Allen & Associates.

† Interns' residence building for St. Mary's Hospital, Grand Rapids, Mich. Multistory building with three and four rooms to each apartment. (mech., elec.) \$150,000. Client, Roger Allen & Assoc.

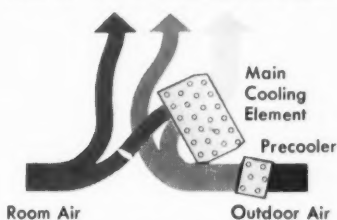
† New facilities for Baldwin high school, Baldwin, Mich. 47,500 sq ft consisting of

Newest Advance in classroom air conditioning

Nesbitt
YEAR-ROUND
SYNCRETIZER



Unsurpassed Humidity Control HOW IT IS ACHIEVED



The exclusive Nesbitt Precooler combined with bypass control assures precise temperature and humidity control for each classroom every day of the year.

As illustrated, the Precooler (a second cooling element) prevents hot, humid outdoor air from entering the classroom without first being precooled and dehumidified. This Precooler adds 15% to 30% free cooling capacity—actually it is capable of wringing one-half gallon of moisture from outdoor air on hot, humid days.

When less than maximum cooling is required, some outdoor air bypasses the main cooling element—but only after being conditioned by the Precooler. Thus, maximum dehumidification is possible under all conditions.

The Nesbitt Year-Round Syncretizer has been designed specifically to meet the performance, safety and budget requirements of schools and colleges for year-round air conditioning. For instance, summer and winter, control of heating, cooling, ventilating and dehumidifying is completely automatic—accomplished quietly, economically.

Operating economies are achieved in mild weather when natural cooling with 100% outdoor air permits hundreds of hours of operation without running refrigeration equipment. Power costs are lower too—the Year-Round Syncretizer moves more air per watt of power consumed than any other unit or system.

Space can be conditioned selectively. Only as much or as little of the building as meets the need can be equipped for air conditioning—and only the space actually in use need be conditioned.

Want to know more about this new advance in classroom air conditioning from Nesbitt? Write for Publication 11-2.

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Heating, Ventilating and Air Conditioning Equipment for Schools

Made and sold by John J. Nesbitt, Inc., Phila. 36, Pa.

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Here's the modern way to meet municipal, industrial and commercial water supply needs



SUMO SUBMERSIBLE PUMPS

It's being proved in installations all over the country. The trend is to Sumo Submersibles as the modern, efficient means of meeting large scale water requirements.

Installed completely inside the well, a single Sumo Submersible pump will provide up to 2000 gpm. Installation is neat and simple . . . no pump house or enclosure is necessary. Operation is noiseless and troublefree. Maintenance is at a minimum.

Sumo pumps incorporate the best features of submersible pump design which has been developed by almost half a century of experience in the manufacture and application of submersible pumps in thousands of different installations throughout the world.

For any large scale water need, be sure to specify SUMO submersibles . . . the modern way to pump. For information,

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The advice and help of Sumo's expert engineering staff is always available without obligation.
Dept. 1

Pumping Dirty Water? SUMO DRAINER PUMPS Are the Answer.

These rugged, dependable, heavy duty 7½ hp electric submersibles are ideal for drainage work, dewatering, flooding or general pumping service. Handles water with 20% solids. Bulletin B-1100 has details. Send for a copy.



SUMO PUMPS INC.

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Sales Representatives in Principal Cities

gymnasium, detached shop building, 21 classrooms, including arts and crafts room, science, homemaking, band room, kitchen, library, and activities room. (mech., elec.) \$450,000. Client, O'Bryon & Knapp, architects.

MINNESOTA

Lindsey Engineering Company
Minneapolis, Minnesota

¶ Sewerage and treatment improvements. (civil) \$105,000. Client, Village of Brahm, Minnesota.

¶ New sewerage system and oxidation pond, preliminary report. (civil) Client, Village of Darwin, Minnesota.

MISSOURI

Russell and Axon

St. Louis, Missouri

¶ Sewers, lift station, and lagoons. (struc., civil, mech., elec.) \$630,000. Client, City of Ellisville, Missouri.

¶ Drainage studies, Wood River, East St. Louis, and Prairie du Pont area. (civil) \$193,000. Client, Corps of Engineers, St. Louis, Missouri.

¶ Water plant and sewerage improvements. (civil) \$40,000. Client, City of Hayti, Missouri.

¶ Water and sewerage improvements. (civil) \$350,000. Client, City of Owensville, Missouri.

¶ Sewage plant improvements. (civil) \$75,000. Client, City of Senath, Missouri.

Uri Seiden and Associates

Kansas City, Missouri

¶ Remodel lobby, Home Savings Association building, Kansas City, Mo. (struc.) \$200,000. Client, Fullerton & McCamis, Architect.

¶ Add full 18th story (roof garden) to Home Savings Association building, Kansas City, Mo. (struc.) \$250,000. Client, Fullerton & McCamis, Architects.

¶ Ward Parkway Shops, Inc., Kansas City, Mo. Flat slab, reinforced concrete roof parking on 50 percent of area; steel framing for balance. (struc.) \$5 million. Client, Fullerton & McCamis, Architects.

¶ Radar tower, Federal office building, Kansas City, Mo. (struc.) \$15,000. Client, Delta Engineering Co.

¶ Belton elementary school, Belton, Mo. Steel framing, one-story. (struc.) \$250,000. Client, V. Preston Terrell, Arch.

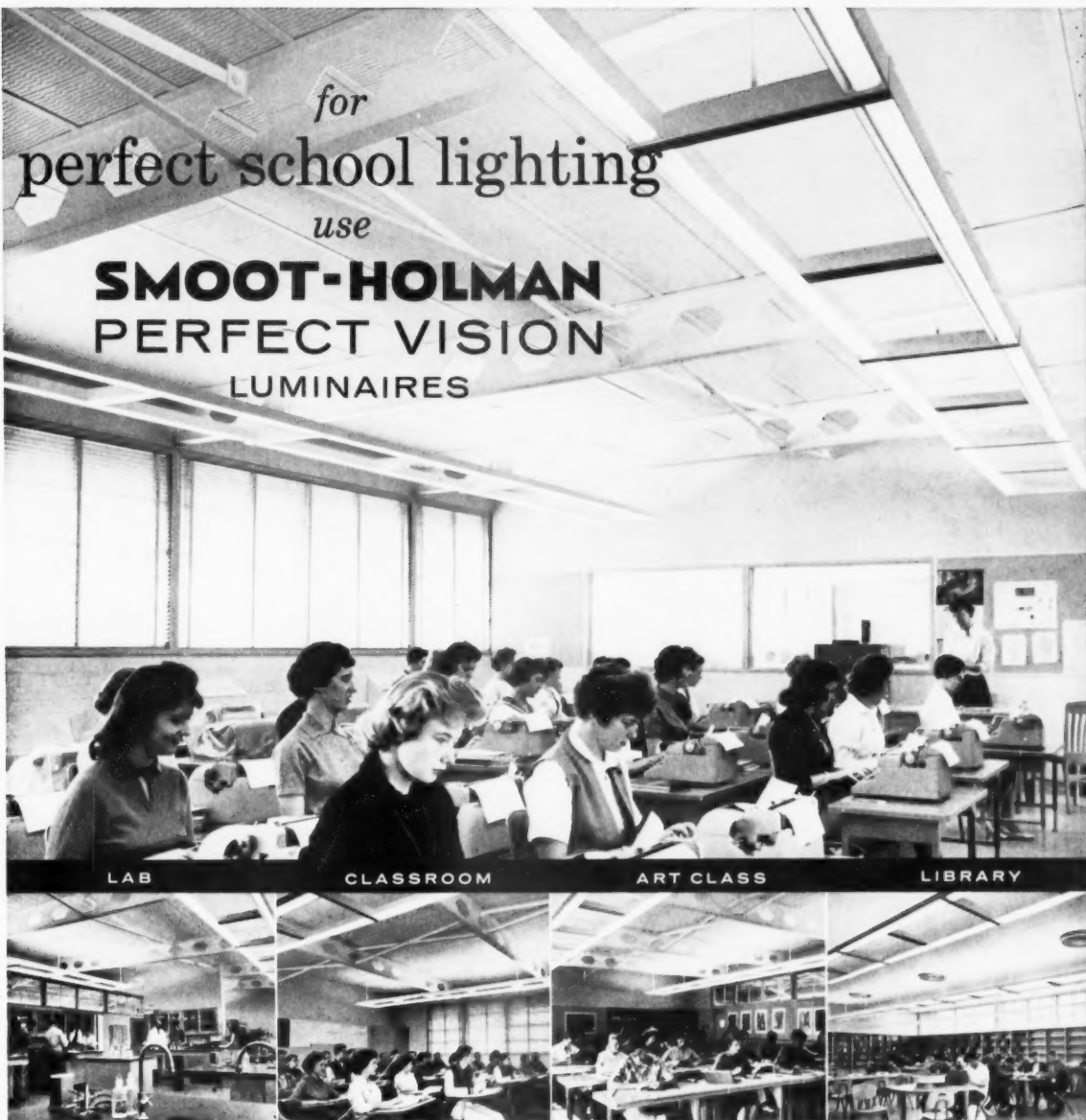
¶ Remodel Dockery Hall, Warrensburg, Mo. Complete new independent structural system for 3-story building to be constructed inside of existing exterior walls which will be salvaged. (struc.) \$250,000. Client, V. Preston Terrell, Architect.

¶ College laboratory school, Warrensburg, Mo. Steel framing, one-story. (struc.) \$300,000. Client, V. Preston Terrell, Architect.

¶ Relocate and elevate airport beacon light. (struc.) \$15,000. Client, Richards-Gebaur AFB, Grandview, Missouri.

¶ Baptiste junior high school, precast concrete floor system on poured-in-place frame, three-story, expandable to five,

for
perfect school lighting
use
SMOOT-HOLMAN
PERFECT VISION
LUMINAIRES



Architects: Marsten & Weston • Consulting Engineers: Ralph E. Phillips, Inc. • Electrical Contractors: McGee Electric Co.

The above photos were taken at Ganesha High School, Pomona, California, and illustrate the excellent lighting furnished by Smoot-Holman fixtures. Winston Nelson, principal of Ganesha High School states, "The fixtures provide ample foot candle illumination spread evenly over each room. We have noticed an absence of flicker and ballast noise, and we are pleased with the easy maintenance of these fixtures." B. J. Triggs, of Ralph E. Phillips, states, "It has long been recognized that indirect lighting is ideal for close work because of its lack of glare reflections and shadows. However, to obtain higher intensities we have used direct lighting. It was not until the advent

of Smoot-Holman P-V series that we found it advantageous to use indirect lighting again. In this school we proved that in a typical classroom (28' x 45') using the 800 m. a. lamps in two rows of P-V fixtures we obtained practically the same illumination intensities as by using conventional 48" rapid start lamps in three rows of direct fixtures. Using only two-thirds of the lineal feet of fixtures and only two-thirds of the lighting outlets and light switches, we actually accomplished a considerable savings to the school board and gave them a better installation."

Send for free, informative brochure, "What You Should Know About School Lighting."

Scientifically designed lighting by **SMOOT-HOLMAN CO.**
321 N. Eucalyptus Ave., Inglewood, Calif.



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**ductile iron steam traps
give you cast steel service
at less than half the price!***



Strong's new 540 series Hydro-Flex Steam Traps are made of DUCTILE (NODULAR) Iron that can be bent or twisted without breaking. This newest metallurgical development, adopted by ASME*, enables Strong to produce traps for service up to 500 psi and 650°F with ample safety factor. Ductile Iron economy permits sale of these traps at less than half the price of comparable cast steel traps.

*Ductile (Nodular) Iron meets the requirements of the ASME Code for use in vessels at pressures to 1000 psi and temperatures to 650°F (80% of cast steel service).

1. **Safer to use** because Ductile Iron body and cover will bend or twist in case of explosion or fire whereas brittle materials might shatter or break.
2. **Especially recommended** for drainage and drip service on high pressure steam systems and on both high and low pressure systems in chemical plants and refineries where steel is normally required.
3. **Wide choice of sizes and capacities:** Pipe sizes from 1/2" to 2", capacities to 42,800 pounds of water per hour.
4. **Connections:** Traps with screwed connections regularly furnished. (Although Ductile Iron can be welded or brazed under controlled shop conditions, welding is *not* recommended for field fabrication.)

Strong 540 Series Ductile Iron Traps are available from your local Strong Distributor. Call him for more information, or contact . . .



STRONG, CARLISLE & HAMMOND

508 SANDUSKY STREET • CONNEAUT, OHIO

air traps • strainers • reducing valves • vacuum or pumping traps
continuous blowdown valves • separators • engine stops • F and T traps

Hickman Mills, Mo. (struc.) \$1 million. Client, Frangkiser & Hutchens, Arch.
¶ Longview Church, Building No. 2, one-story masonry bearing walls, steel roof construction, Hickman Mills, Mo. (struc.) \$50,000. Client, Everitt & Kelti, Architects.

NEVADA

Jack A. Means

Reno, Nevada

¶ Bank and office building, 6 stories, for Union Federal Savings & Loan, Reno, Nev. (struc.) \$750,000. Client, DeLongchamps & O'Brien, architects.

¶ Courthouse and jail additions, Washoe County courthouse, Reno, Nev. (struc.) \$1,750,000. Client, DeLongchamps & O'Brien, architects.

¶ Site adaptation, seven basic elementary school units, Reno, Nev. (civil, struc., mech., elec.) \$920,000. Client, Washoe County School District.

¶ Shopping center, Reno, Nev. (struc.) \$200,000. Client, Edward S. Parsons, architect.

¶ Bank and shopping center, Reno, Nev. (civil, struc., mech., elec.) \$450,000. Client, McKenzie Construction, Inc.

NEW JERSEY

Dwight Engineering

Englewood, New Jersey

¶ Blessed Sacrament Roman Catholic Church, Paterson, New Jersey. (mech., elec.) \$500,000. Client, Anthony J. DePace, Architect.

¶ Presbyterian Community Church addition, Bloomfield, New Jersey. (mech., elec.) \$125,000. Client, Osborne & Osborne, Architects.

¶ Lodge building and motel, High Point, New Jersey. (mech., elec.) \$110,000. Client, Moon, Iwatsu & Macksoud, Arch.

Melvin H. Friedman & Associates

Bergenfield, New Jersey

¶ Office building, 30,000 sq ft, plumbing, sprinklers, septic system for 200 people, heating, cooling, and electric. (mech., elec.) \$500,000. Client, Rayco Corp.

Joseph S. Ward

Caldwell, New Jersey

¶ West Essex regional junior-senior high school, No. Caldwell-Caldwell Township, New Jersey. (soil and foundation studies) \$5.5 million. Client, David Ludlow, Arch.

¶ Caldwell-West Caldwell high school. (soil and foundation studies) \$2.9 million. Client, Micklewright and Mountford, architects.

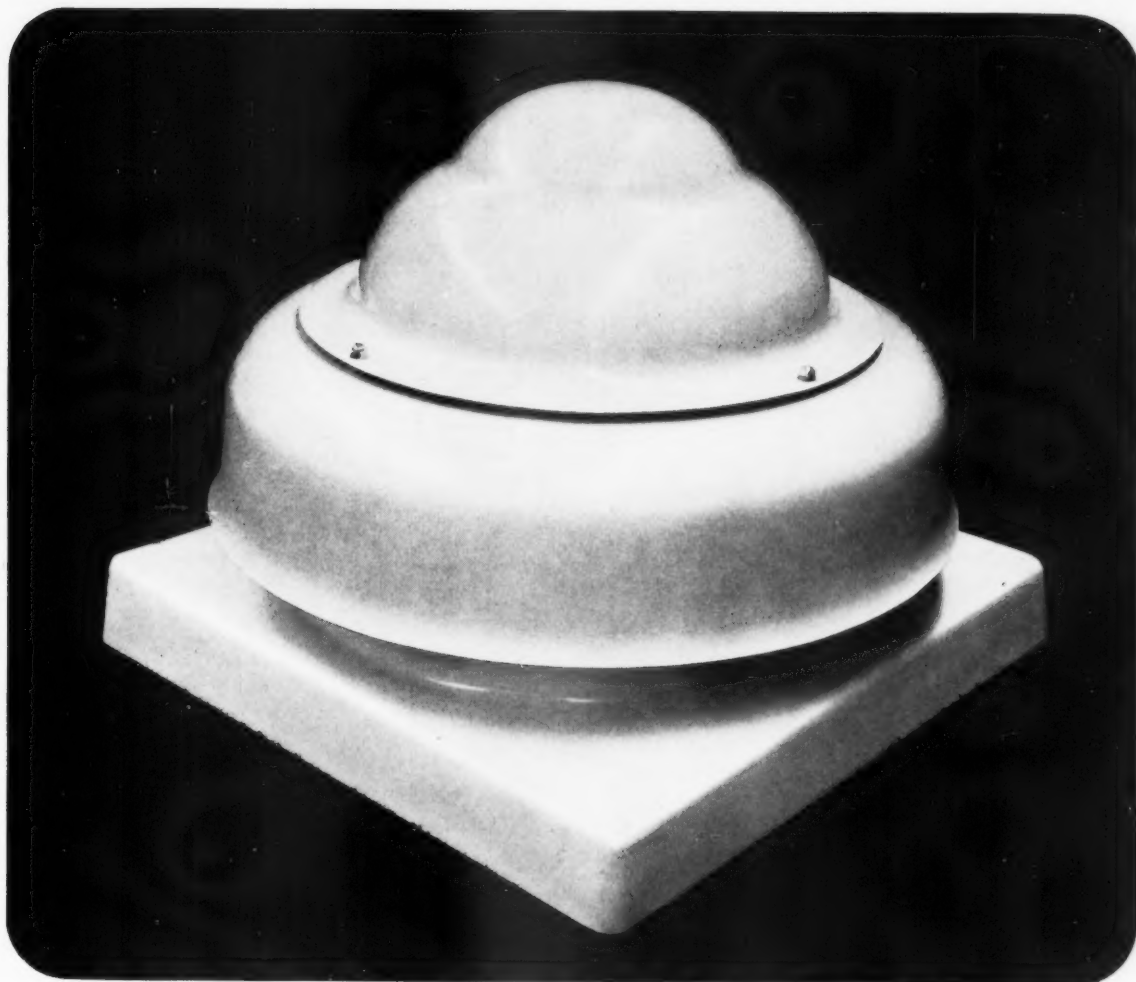
NEW YORK

V. L. Falotico & Associates

Brooklyn, New York

¶ F. D. Roosevelt Houses — two 21-story buildings, five 16-story buildings, Manhattan, New York City. (mech., elec.) \$16 million. Client, Gustave W. Iser, Architect.

¶ Rikers Island alterations and additions. Two new rehabilitation buildings, altera-



Introducing the all new "FIBER-AIRE" by Swartwout

**All Fiberglas* Housing
Super Quiet
Indestructible
High Efficiency**

- Fiber-Aire's all Fiberglas* housing actually **absorbs** noise and vibration . . . sets a new standard for ventilator quietness.
- Bonded Fiberglas* housing is virtually impossible to dent, crack or break . . . unaffected by salt spray, weather, fumes and most chemicals.
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- Stainless steel air flow guides eliminate internal air shocks . . . increase efficiency . . . cut vibration.
- High efficiency throat and outlet minimize loss from friction and turbulence.

Fiber-Aire units are now available for immediate delivery in 21 direct and belt drive models with capacities from 180 to 4,000 CFM.

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...WITH *Servisafe* BRACKET UNITS!

Servicing wall or pole-mounted luminaires *at ground level* is the most practical method because it is the safest, fastest and most economical. With "Servisafe" Bracket Units, one man can relamp and clean luminaires within minutes in any kind of weather. There are no climbing or electrical dangers. And no costly auxiliary equipment is required. "Servisafe" Bracket Units can be used for new installations or quick conversion of existing facilities. Supplied as complete packages ready for wiring and erecting, they can be mounted on walls, wood poles and other structures to provide year-round lighting efficiency with minimum maintenance cost.

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THE THOMPSON ELECTRIC CO.

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tion and addition to boiler plant, new generators, alterations and additions to laundry, kitchen building, bakery building, and utilities. (mech., elec.) \$14.5 million. Client, Chapman, Evans & Delehanty, architects.

¶ West Brighton Houses — eight 8-story buildings, eighteen 2-story buildings. (mech., elec.) \$6 million. Client, Irwin W. Clavan, Architect.

¶ St. Joseph Villa, convent and novitiate, Rockville Center, L.I., N.Y. (mech., elec.) \$1.5 million. Client, J. Mathieu.

¶ Gompers Houses — six 20-story buildings, Manhattan, New York City. (mech., elec.) \$14 million. Client, Lama, Broskauer & Prober, Architects.

¶ Junior high school, Brooklyn, New York. (mech., elec.) \$3.7 million. Client, DeYoung, Moscovitz & Rosenberg, Arch.

Bogert & Childs

New York, New York

¶ Sewage treatment plant. (civil, struc., mech., elec.) \$480,000. Client, Town Board, Orangetown, New York.

Harold E. Rist, Associates

Glens Falls, New York

¶ Water supply and distribution system. (civil) \$500,000. Client, Town of Caldwell, New York.

¶ Water supply system. (civil) \$30,000. Client, Diamond Point, New York.

¶ Sewerage collection and treatment. (civil) \$800,000. Client, Town of Caldwell, New York.

¶ Highway, 5-mile section. (civil) \$400,000. Client, Clinton County, New York.

¶ Highway, 4-mile section. (civil) \$350,000. Client, Warren County, New York.

¶ School addition, Newcomb, New York. (civil, struc., mech., elec.) \$250,000. Client, Milton Crandell, architect.

¶ School addition, Tanawus, New York. (civil, struc., mech., elec.) \$50,000. Client, Milton Crandell, architect.

¶ Industrial plant, 30,000 sq ft. (civil, struc., mech., elec.) \$350,000. Client, Adirondack Box Co.

Charles E. Ward

Great Neck, New York

¶ Design for enlarging and rebuilding existing primary treatment plant to provide secondary treatment and increase capacity. (civil) \$1 million. Client, Great Neck Sewer District.

¶ Design of sewers for recently annexed area. (civil) \$400,000. Client, Great Neck Sewer District.

Dwight Engineering

Englewood, New Jersey

¶ Immaculate Conception Convent, New York City. (mech., elec.) \$230,000. Client, Anthony J. DePace, Architect.

NORTH CAROLINA

W. M. Wallace II

Durham, North Carolina

¶ Diagnostic and treatment center addition to Duke Hospital, Durham, N.C. One-story addition including two cobalt treatment rooms, two X-ray therapy

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Been looking at gauge buying in your plant as "routine"? In terms of gauge performance you need, accuracy you get, price you pay . . . and how and where you buy? You can pick up real savings with a closer look at your gauge requirements . . . and at what United States Gauge offers. USG features the world's largest stock of indicating dial pressure gauges. Over 50,000 standards, plus specials, with all possible choices of sizes, case stylings, pressure ranges and case materials . . . up to and including the finest gauges of highest accuracy. One source meets 99% of your pressure gauge needs, with the exact gauge for the exact purpose at the right price. And one phone call to your USG distributor taps that source. See the Yellow Pages, or write for catalogs and name of your nearest USG distributor today.



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Division of American Machine and Metals, Inc., Sellersville, Pa.



Replacement costs too high? Volume-priced, precision-built USG drawn-case gauges are the money-savers for replacement of any A.S.A. Grade B gauge in your plant (accuracy of 2% guaranteed). These standbys are specified by more than 60% of original equipment manufacturers today. Proof of USG reliability and value! Write for Catalog 64A.



Paying a premium for quality design, reliability? Check the new USG A-Line, premium design at savings up to 40% of premium prices! Meets A.S.A. Grade A Standards, including accuracy of 1%. Wide range of cases, sizes, movements, pressures cuts you in on A-Line savings wherever you need dependable gauge performance. Write for Catalog 305.



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Losing out on highest accuracy? USG Test Gauges are the elite of the industry, equalling or exceeding A.S.A. Grade AA standards with accuracy as high as 0.2 of 1%! Styles, sizes and case materials for all types of laboratory and test uses. You can't buy higher quality and precision in a test gauge! Get your money's worth at USG. Write for Catalog 400.



"push button" access locks eliminate human error



*Henry Pratt
access locks
at MIT Test
Reactor*

Absolute integrity is assured any Nuclear Reactor Containment Vessel when Henry Pratt Co. Access Locks are provided. Completely automatic, these unique safety devices are interlocked so that entrance and exit to the vessel is accomplished with ease, in 25 seconds, with complete safety.

The knowledge and experience gained through installations at Vallecitos (GETR), Arco (EBR-2), M.I.T. (test reactor), Ispra, Italy (CNRN) and others, has enabled the Henry Pratt Co. to offer a complete line of standard sizes for both personnel and equipment in high pressure and low pressure design.

Among exclusive Henry Pratt Co. Access Lock features are:

1 Inflatable Seal Personnel Air Locks. Either round or rectangular. Only one second is required to inflate or deflate the seal from readily available plant air supply. Emergency inflation can be provided by standby nitrogen tanks or air reservoirs. Push button actuated, only proper sequence of buttons will operate doors. Eliminates error. Flush-floor doors for easy passage of personnel or hand-trucks. Features pressure equalizing valves which prevent radical pressure changes within lock.

2 Inflatable Seal Equipment Locks. Design provides 8' x 10' opening. Flush mounted doors permit use of full area for equipment passage. Features pressure equalizing valves which prevent radical pressure changes within lock.

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rooms, laboratory, examining rooms, offices, and waiting room. Reinforced concrete, native stone, gothic design to match existing hospital, fully air conditioned. (mech., elec.) \$350,000. Client, Office of Horace Trumbauer, W. O. Frank & W. E. Frank, architects.

¶ Biological sciences building, Duke University, Durham, N.C. 5-story building, 240 x 200 feet, E-shape, reinforced concrete, brick colonial design. Forestry school, zoology department, botany department, library stacks, auditorium. Partially air conditioned. \$3.5 million. Client, Office of Horace Trumbauer, W. O. Frank & W. E. Frank, architects.

OHIO

Varo Engineers

Columbus, Ohio

¶ Highway bridge over N.Y.C. & St. Louis Railroad and Snake Creek. Cambridge Avenue, Canton, Ohio. \$235,000. Client, Stark County Commissioners.

¶ Coal haulage road bridge over state route 13, 37, and 75 near New Lexington, Perry County, Ohio. \$50,000. Client, Sunnyhill Coal Co.

F. H. Pasiadis & Associates

Cleveland, Ohio

¶ Church and school, Cleveland, Ohio. 52-ft nave, A-frame construction with marble floor, and 165-ft steel spire. Offices and meeting lobby, air conditioned, 12 classrooms. All heated by gas-fired boiler. (mech., elec.) \$500,000. Client, St. Mary's Romanian Orthodox Church.

OKLAHOMA

J. B. Payne & Associates, Inc.

Enid, Oklahoma

¶ Street paving. (civil) \$86,860. Client, Town of Shahuck, Okla.

OREGON

Delmar L. McConnell

Portland, Oregon

¶ Design combination hangar and office building, Seattle-Tacoma International Airport. \$1,250,000. Client, Pacific Northern Airlines, Inc.

PENNSYLVANIA

Gustav Stueber, P.E.

Pittsburgh, Pennsylvania

¶ Dormond Tire Co. alteration and addition, Dormond, Pa. (civil, struc.) \$60,000. Client, M. J. Laghort, architect and P. S. Edwards Co., contractor.

¶ Garage building for J. Holtgrauer and Ernie Gruber, masonry and steel structure. (civil, struc., mech.) \$35,000. Client, Earl Bauer, architect.

Edward A. Moy, P.E.

Woodbury, New Jersey

¶ Penn Center bowling alleys, Philadelphia, Pa. (elec.) \$25,000. Client, Belante and Clauss, architects.

¶ F. W. Woolworth store and district headquarters, Philadelphia, Pa., rede-

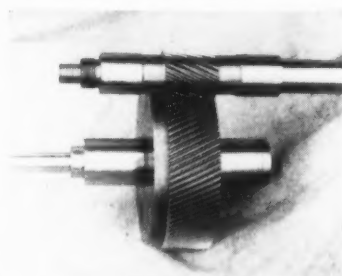
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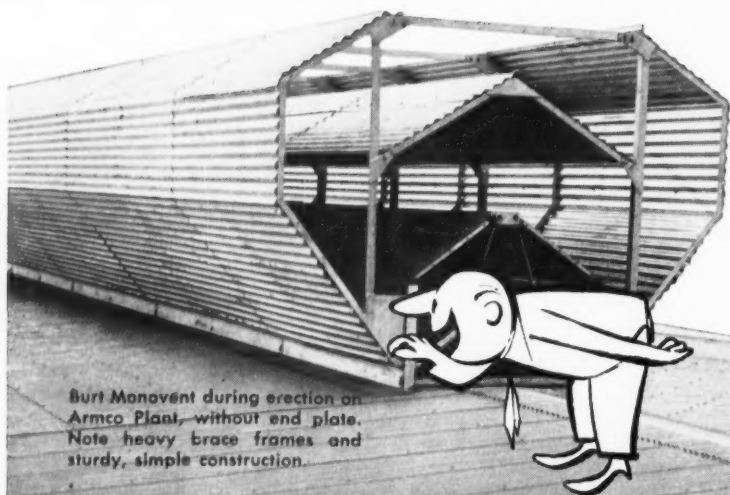
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MEMBER AIR MOVING & CONDITIONING ASSOCIATION, INC.

sign. (elec.) \$75,000. Client, Roanoke Construction.

¶ Rockledge Plaza, stores and apartments, Rockledge, Pa. (elec.) \$10,000. Client, Paul Kuhle, Peschel, Kuhle and Zimmerman, architects.

¶ Brookview elementary school, Falls Township, Bucks County, Pa. (elec.) \$35,000. Client, in association with H. G. Metzger and Assoc. for Bellante and Clauss, architects.

Gilbert Associates, Inc.

Reading, Pennsylvania

¶ Unit No. 2 extension to Portland station, Portland, Pa., including 1,750,000-lb per hr boiler unit and 250-Mw turbine. (struc., civil., mech., elec.) \$25 million (est.). Client, Metropolitan Edison Co., Reading, Pa.

TENNESSEE

John C. Brough, Jr.

Memphis, Tennessee

¶ Kingsbury elementary school, 65,000 sq ft, reinforced concrete, two-story building with multiple barrel shell reinforced concrete roof spanning 63 feet. (struc.) \$541,000. Client, Dean E. Hill.

¶ Richland junior high school, Memphis, Tenn. 67,000 sq ft, reinforced concrete one-story architectural concrete and window wall exterior, 100-ft span prestressed concrete folded plate roof over gym and auditorium. (struc.) \$677,000 (est.). Client, Mann & Harrover, Arch.

William J. Funk, Engineer

Chattanooga, Tennessee

¶ Funeral home, Chattanooga. (struc.) \$138,000. Client, Hunt-Caton, Architects.

¶ Paint center and bakery, Chattanooga. (struc.) \$90,000. Client, Butler & Wilhoit, Architects.

¶ Annicola school, Chattanooga. (struc.) \$75,000. Client, Butler & Wilhoit, Arch.

¶ Sherman & Reilly, Inc. factory, Chattanooga. (struc.) \$100,000. Client, Sherman & Reilly, Inc.

¶ Hotel motor courts, Chattanooga. (struc.) \$150,000. Client, Butler & Wilhoit, Architects.

William F. Appleton

Kingsport, Tennessee

¶ St. Anne's parochial school, Bristol, Virginia-Tennessee. Classroom addition plus changes in electrical system and heating plant. (mech., elec.) \$80,000 (est.). Client, C. B. Kearfott, Architect.

¶ First Baptist Church, Kingsport, Tenn. New educational building and changes in existing buildings, plus snow melting system. (elec.) \$300,000 (est.). Client, First Baptist Church.

WISCONSIN

Thomas J. Higgins Associates, Inc.

Chicago, Illinois

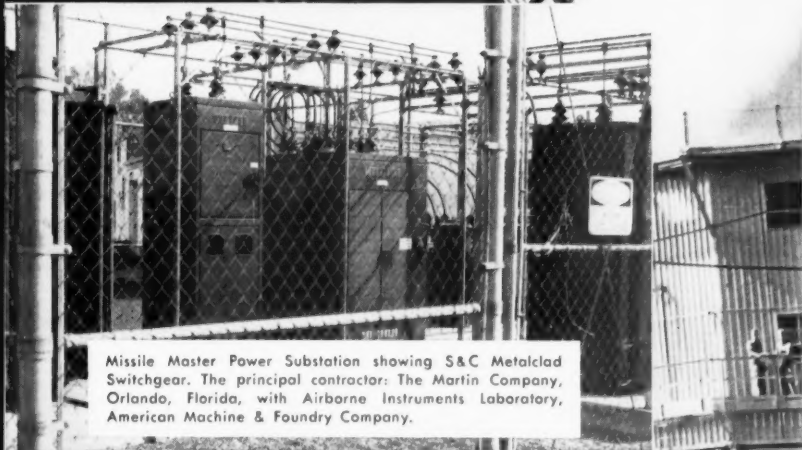
¶ Remodel library building, Queen of Peace Monastery, Lake Geneva, Wis. Includes carpentry, cabinets, new floors, sash, inside trim, steel stairs, new boiler, burner, tank, heating equipment, and

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new electric fixtures and wiring. (civil, struc., mech., elec.) \$150,000. Client, Franciscan Fathers.

FOREIGN

Rader and Associates
Miami, Florida

¶ Extensions and additions to International Airport, San Juan, P. R. Design work includes extending runway and taxiway to 9400 feet, making provision for subsequent extension to 10,500 feet. Also includes east, west, and a truck apron. \$2.5 million.

J. U. Moreau & Associates

Trois Rivieres, Quebec, Canada
¶ Institute of Technology building. (mech., elec.) \$1 million. Client, Department of Social Welfare & Youth, Province of Quebec and Denoncourt & Denoncourt, architects.

Romeo Morrisette

Cap-de-la-Madeleine, Quebec, Canada
¶ School and residence. Client, Laverendry Construction Co., Ltd., Proulxville.

B-lt, Lemmon and Lo

Honolulu, Hawaii
¶ 200-bed hospital, Clark Air Force Base, Philippines. Joint venture with Isadore & Zachary Rosenfield, New York. (civil, struc., mech., elec.) \$4 million. Client, U.S. Navy (construction agent for U.S. Air Force).
¶ Readiness crew building and shop aircraft maintenance organization, Andersen Air Force Base, Guam. (civil, struc., mech., elec.) \$300,000. Client, U.S. Navy (construction agent for U.S.A.F.)

Gilbert Associates, Inc.

Reading, Pennsylvania
¶ Unit No. 6 extension to Rockwell station, 60,000-kw turbine. (civil, struc., mech., elec.) \$10 million (est.). Client, Manila Electric Co., Philippine Islands.

Crowther, MacKay & Associates, Ltd.

Calgary, Alberta, Canada
¶ Chinook shopping center, including major department store (Woodward's) and approximately 40 smaller stores, air conditioned. (mech.) \$8 million (total contract). Client, James C. Page, architect, and Woodward's Stores Limited.

H. Yellin

Dallas, Texas
¶ Products pipeline terminal and oil tank farm for Empresa Colombiana de Petroleos, Bogota, Colombia, South America. (struc., civil, mech., elec.) \$1,150,000. Client, Empresa Colombiana.

Rensaa & Minsos

Edmonton, Alberta
¶ Terminal building, Edmonton International Airport. (struc., arch., mech., elec.) \$6 million. Client, Department of Transport, Canada.
¶ Royal Alexandra Hospital, Edmonton. (struc.) \$6 million. Client, City of Edmonton, Canada. ▲▲

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Consulting Engineers' Calendar

May 4-6. Construction Specifications Institute; National Convention, Palmer House, Chicago, Illinois.

May 4-8. American Society of Civil Engineers; Cleveland Convention, Hotel Cleveland, Cleveland, Ohio.

May 6. American Institute of Consulting Engineers; Luncheon Meeting, Engineers Club, New York, N.Y.

May 11-13. American Society of Mechanical Engineers, American Institute of Electrical Engineers, Institute of Radio Engineers; Joint Automation Conference, Pick Congress Hotel, Chicago, Illinois.

May 11-13. Instrument Society of America; Annual Power Conference, President Hotel, Kansas City, Mo.

May 17-20. American Institute of Chemical Engineers; National Meeting, Hotel Muehlebach, Kansas City, Missouri.

May 19-21. American Institute of Electrical Engineers; Middle Eastern District Meeting, Hotel Lord Baltimore, Baltimore, Maryland.

May 20-21. Building Research Institute; Conference on Building Illumination, Statler-Hilton Hotel, Cleveland, Ohio.

May 20-22. American Society of Civil Engineers; Jet Airport Conference, Shamrock-Hilton Hotel, Houston, Tex.

June 3. American Institute of Consulting Engineers; Luncheon Meeting, Engineers Club, New York, N.Y.

June 4-5. The University of Wisconsin Extension Div.; Consulting Engineers

Institute, The University of Wisconsin, Madison, Wisconsin.

June 14-18. American Society of Mechanical Engineers; Semiannual Meeting, Chase-Park Plaza, St. Louis, Mo.

June 17-20. National Society of Professional Engineers; Annual Meeting, Commodore Hotel, New York, N.Y.

June 21-26. American Institute of Electrical Engineers; Summer and Pacific General Meeting, Olympic Hotel, Seattle, Washington.

June 22-23. Illuminating Engineering Society; Great Lakes Regional Conference, Statler Hotel, Buffalo, N.Y.

July 1-3. American Society of Civil Engineers; Hydraulics Conference, Colorado State U., Fort Collins, Colo.

August 9-12. American Society of Mechanical Engineers, American Institute of Chemical Engineers; Heat-Transfer Conference, University of Connecticut, Storrs, Connecticut.

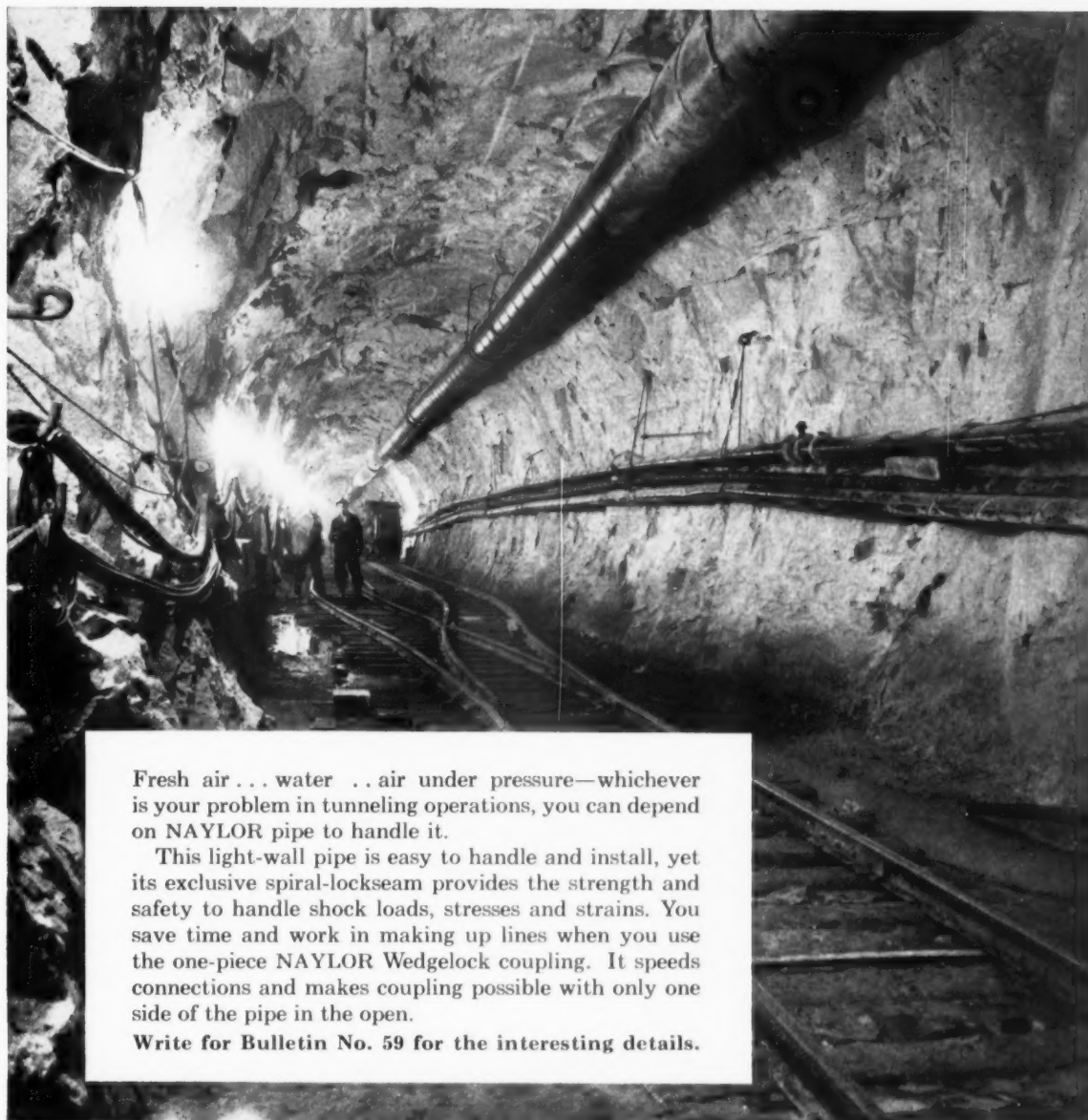
August 25-27. American Institute of Electrical Engineers; Petroleum Industry Conference, Wilton Hotel, Long Beach, California.

Sept. 9. American Institute of Consulting Engineers; Luncheon Meeting, Engineers Club, New York, N.Y.

Sept. 27-30. American Institute of Chemical Engineers; National Meeting, Hotel St. Paul, St. Paul, Minn.

Sept. 30-Oct. 2. American Society of Mechanical Engineers, American Institute of Electrical Engineers; National Power Conference, Hotel Muehlebach, Kansas City, Missouri.

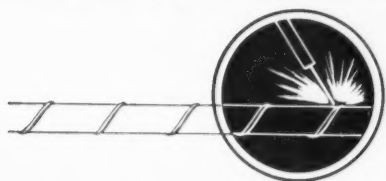
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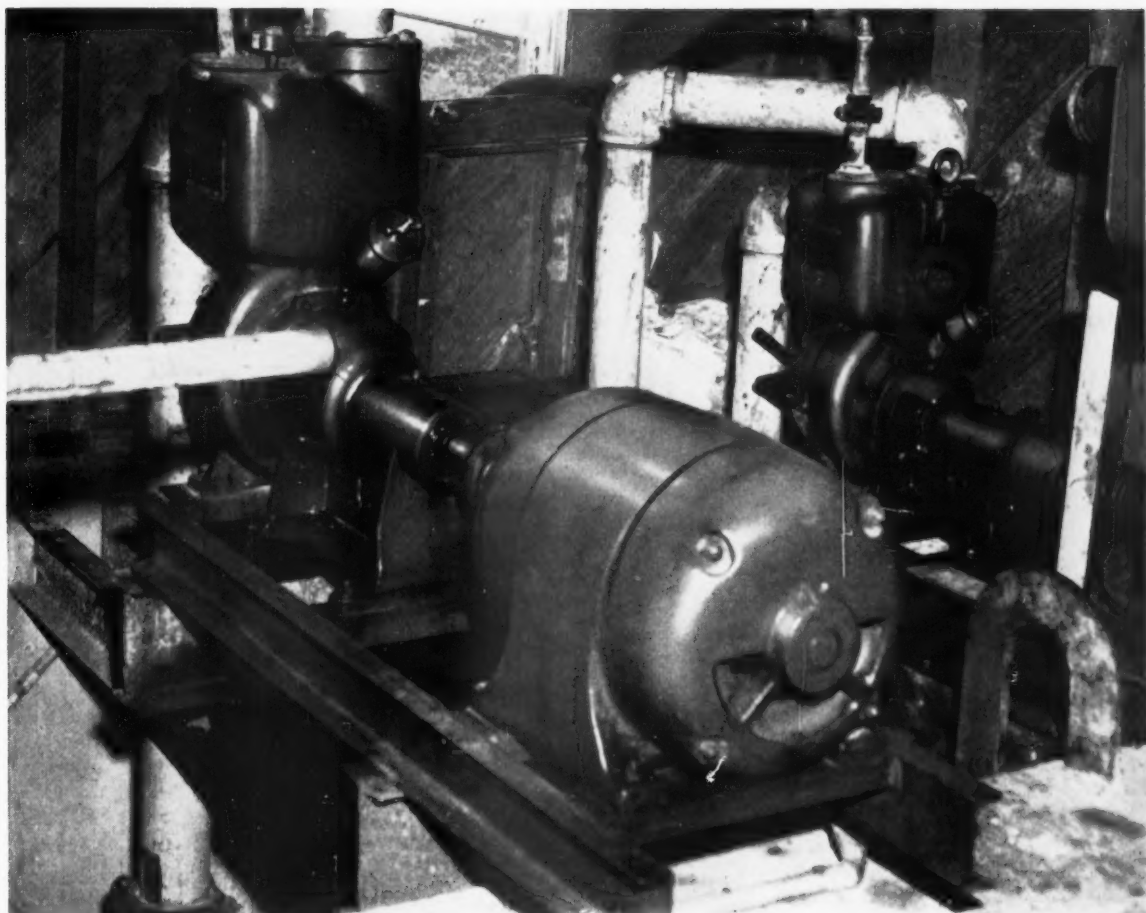
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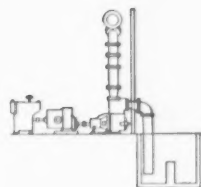
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Simpler, lower-cost installations and lower maintenance is now possible with the unique Gorman-Rupp Sewage Pump.

The high-and-dry, non-clogging design permits radical changes in lift stations and treatment plants. In a typical instance, less than *half* the cost of alternate equipment. And the maintenance has been almost nil.

Here are the facts: self-priming in lifts up to 15 feet, positive in action,

nearly completely non-clogging. Removable end plate provides fast access to impeller with just a turn of the wrist. No longer need pump servicing be done in the pit or by raising whole unit by crane. Unit is high and dry. The non-clogging impeller passes spherical solid as follows: 3" pump, 1½" solids; 4" pump, 2" solids; 6" pump, 2½" solids. Write now for full details. Ask for illustrated bulletin and specification data sheets.



In Jacksonville area: first unit installed in 1951 and still in service; second and third units added since.

THE GORMAN-RUPP COMPANY

305 Bowman Street

Mansfield, Ohio

Amvit VITRIFIED CLAY LINER PLATES

protect concrete structures from disintegration

**CLAY LINER PLATES ARE
UNAFFECTED BY EROSION, ABRASION
OR CORROSIVE ACIDS OR GASES**

For complete protection of concrete pipe sewers, industrial sewers, acid vats, sewage treatment tanks, neutralizing baths, culverts, retaining walls, and bridges use Amvit clay liner plates for these five big reasons:

1. RESISTS ACID ATTACK — Amvit Liner plates are specially manufactured to meet all application requirements which entail resistance to acids, alkalies, and chemical reaction. They are made of the same high grade clays that go into famous Amvit sewer pipe. They are formed, dried, and vitrified to obtain clay pipe density and hardness.

2. PREVENTS ABRASION — Amvit Liner plates are not affected by the wearing action of sand, rocks, gravel, or other solids often encountered in streams and rivers. They protect all surfaces against corrosion and abrasion.

3. EASY INSTALLATION — Amvit Clay Liner Plates, hardened, glazed, and durable, permanently bond and lock to masonry and concrete work. They are easily installed on concrete forms and are sized according to standardized specifications for uniform spacing.



4. SIZES FOR EVERY JOB — To meet the applications of liner plates in industry, sewerage, and drainage, they are manufactured flat or curved, in 24-inch lengths, 9 inches wide. Lengths under 24 inches for special applications are available on request.

STANDARDS FOR CURVED LINER PLATES

Diameter Sewer	Pieces Required For Circle	Radius	Diameter Sewer	Pieces Required For Circle	Radius
Inches	Number	Inches	Inches	Number	Inches
24	8	12	69	23	33
27	9	13½	72	24	33
30	10	16½	78	26	45
33	11	16½	84	28	45
36	12	18	90	30	45
39	13	21	96	32	45
42	14	21	102	34	45
45	15	21	108	36	60
48	16	24	114	38	60
51	17	26¼	120	40	60
54	18	26¼	126	42	60
57	19	26¼	132	44	60
60	20	33	138	46	60
63	21	33	144	48	72
66	22	33			

5. LOW COST "LIFE INSURANCE" — Building Amvit Liner Plates into the original structure assures a reduction in maintenance and an increase in life expectancy far beyond the cost of liner plate protection.

For your next job, specify *Amvit Clay Liner Plates* by brand. Your local concrete pipe manufacturer can obtain them on short notice.

For more information, write or call for our detailed booklet on Amvit Liner Plates. American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.



SINCE 1848



**American Vitrified
Products Company**

NATIONAL CITY BANK BUILDING
CLEVELAND, OHIO

Contractor:
Roland
Thompkins &
Son, Inc.
Hawthorne, N.Y.

*Consulting
Engineer:
Giffels &
Vallet, Inc.
Detroit, Mich.*

Architect:
L. Rossetti
Detroit, Mich.

-the Comfort Computation

came out . . .

DUNHAM-BUSH



The Dunham-Bush 'HAH' is designed for ceiling installation which conserves space vitally needed for engineering purposes.



Close-up of Dunham-Bush 'HAH' which cools, heats, filters, dehumidifies air.

Of course, IBM really didn't employ any of its masterfully precise computers to predetermine whose air conditioning equipment would best serve their new Engineering Laboratory at Kingston, New York.

But all equipment selected was calculated to meet the important demands modern industry must make to ensure personnel comfort and equipment protection.

For example, here at Kingston, 92 engineered Dunham-Bush Horizontal Air Handling units efficiently deliver conditioned air to create the climatic interior that's seasonally required. Dunham-Bush units have operational versatility that enables them to cool, heat, filter, or dehumidify air, according to temperature requirements. Additionally, such Dunham-Bush heating products as finned tube radiation with expanded metal covers, horizontal and cabinet type unit heaters, and F&T traps and strainers are used throughout the laboratory.

Contact your nearest Dunham-Bush sales representative for assistance when your next heating or cooling job arises.

You'll find that this one source—one responsibility is of inestimable value.

Dunham-Bush, Inc.

WEST HARTFORD 10 • CONNECTICUT • U. S. A.





DUNHAM-BUSH

AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER

WEST HARTFORD, CONNECTICUT • MICHIGAN CITY, INDIANA
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MARSHALL, J. F. and J. W. RIVERSON. 1979.

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 GEORGINA BAKER (CANADA), LTD.

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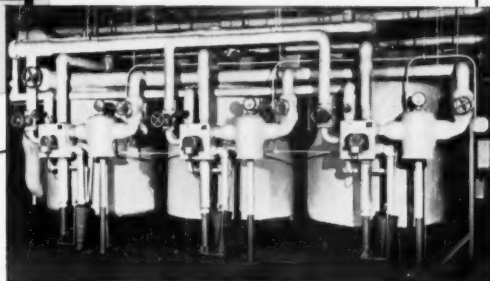
Business **TRUCKER'S MUGS: L.T.E.** **Callaway II** **WILLIAMS JR. & COMPANY, L.P.**

Progress in water conditioning . . .

soften water

Automatically

**with a
Cochrane
sodium zeolite
system**



The Sodium Zeolite process is the simplest, most popular means of converting hard water to soft water for industrial use. No chemicals are added, no precipitates formed, yet zero hardness water is produced.

Cochrane's exclusive Hydromatic Single Control Valve makes the Zeolite process even simpler, more reliable and more economical. This Single Control Valve takes the place of 6 or more gate valves of the old-fashioned design. Operation can be manual, semi-automatic or completely automatic.

Check these advantages of Cochrane Hydromatic Valves:

- The cast iron split-case valve body is new in design with removable cover. This permits larger, smoother internal passageways resulting in lower loss of head. It also permits easy access to the inner valves and seats without disconnecting piping.
- Inside the body are the six inner single seat diaphragm valves hydraulically actuated by a rotating multiport pilot valve. For automatic control a 40 watt motor drives the pilot shaft through a gear. These non-leaking, non-scoring inner valves with compressible rubber valve discs prevent contamination of treated water by brine or raw water.
- Automatic control of backwash and rinse flow rates even with variable raw water pressure—eliminates rate-of-flow controllers or float operated butterfly valves behind orifices in large concrete sumps.
- Slow valve action prevents hydraulic shock to zeolite or supporting bed and piping.

Wherever Sodium Zeolite Softening is indicated, Cochrane's experience and superior equipment design assure top performance. For more information on Cochrane Sodium Zeolite Softeners, write for Publication 4520-D.

Cochrane CORPORATION

3112 N. 17th Street, Philadelphia 32, Pa.

Philadelphia • New York • Chicago

Cochrane Water Conditioning, Limited, Toronto, Montreal, Winnipeg, Canada.

Demineralizers • Zeolite Softeners • Hot Process Softeners • Hot Lime Zeolite Softeners • Dealkalizers • Reactors • Deaerators • Pressure Filters
Continuous Blowoff Systems • Condensate Return Systems • Steam Specialties

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POTTSTOWN METAL PRODUCTS DIVISION—
Custom built carbon steel and alloy products.

Part 2 May 1959

Consulting Engineer

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A DIRECTORY OF ADVERTISERS' LITERATURE



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1—Bin Discharge Valve

Bulletin describes a new valve for hopper and bin discharge. Forms an airtight seal under negative pressure, releasing material from the hopper when weight of the material forces it through the valve. Valve has no mechanical parts consisting only of a Neoprene sleeve resistant to most chemicals, high temperatures. *Dustex Corp.*



2—High Efficiency Cyclones

Bulletin C-103 describes design and construction of Buell high-efficiency cyclones. Features include exclusive "Shave-off" port which traps extra percentage of dust, particularly smaller fines. Fully illustrated. Lists all information necessary for specifying. Covers importance of manifolding. *Buell Engineering Co.*



3—Automatic Filter

Bulletin B-1400-2B describes the design and operation of the Roll-Kleen automatic filter. Unit is a disposable media filter which automatically changes media in face of filter when indicated by pressure drop. Units come in 3, 4, and 5 feet wide and from 5 to 15 feet high. Capacity tables, motor requirements. *Farr Co.*



4—Industrial Dust Control

Bulletin 800 contains full technical information on industrial dust control and recovery equipment. Five types of dust filters are described in detail—four bag-type collectors, one cyclone type. Complete specifications for each model within each series are included. Photographs illustrate existing dust control systems. *Dracoo Division of Fuller Co.*



5—Vacuum Cleaner

Bulletin 153D describes the Spencer Vacuslot. Illustrates the system and its components, and describes the operation. Dirt and litter is pushed to the Vacuslot and whisked away through the piping; mops are then cleaned at the Vacuslot. Illustrates water pick-up, boiler cleaning, and vacuum cleaning. *Spencer Turbine Co.*



6—Dust Collectors

Bulletin describes cabinet cloth filter dust collectors and their advantages. Contains illustrations of actual installations together with multiple rating tables, complete specifications, and floor space requirements. Also included are dimensional drawings of the product. Bulletin is printed in 2 colors. *Torit Manufacturing Co.*



7—Dust Collectors

Dustkop model 30N50P, a one-unit system serving 7 grinders. Where floor space is limited, unit is suspended from ceiling or installed on roof. Pipe is angled from collector to caster-mounted dust drum placed in any unused area. Drum is rolled to outside dumping point and emptied without recirculating dust. *Agel Manufacturing Co.*



8—Dust Control Systems

Catalog SJP-1001 describes new Chem-Jet dust control systems for suppression of coal dust at rotary car dumpers, car shakeouts, track hoppers, conveyor transfer points, coal crushers, reclaim hoppers, and coal storage piles. Includes description of new Type A Hydro-Precipitator scrubber. *Johnson-March Corp.*



9—Dust Collectors

Four-page bulletin 163-5 describes standard bag type dust collectors designed for noncontinuous or intermittent service and lighter dust loads. Cutaway view, elevation drawing, and table of dimensions and capacities are given, with a description of both the electrical and compressed air shakers. *Northern Blower Co.*



10—High-Velocity Air Filters

New two-page bulletin 130 describes new high-velocity Aerosolve filters which, in comparison with standard Aerosolve filters, provide 80% more air volume per sq ft of face area. Rated face velocity of 450 fpm permits use in high-velocity duct systems without V-ing. Interchangeable cartridges 35%, 85%, 95% efficient. *Cambridge Filter Corp.*



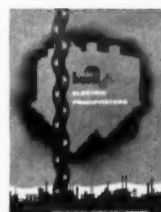
11—Induced Draft Fans

Catalog SF10 describes the complete line of Whirlex induced draft fans including construction details. Included is information on independent pedestals, sole plates, self-supporting stacks, and special ductwork. Component parts are illustrated and cutaway photo shows operation of fan. *Fly Ash Arrestor Corp.*



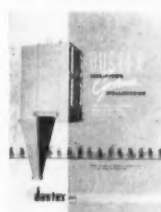
12—Dust Precipitator

Bulletin No. 258-A describes new high-velocity electro-cell electrostatic efficient dust precipitator. Shallow, small face area, minimum space requirement. Completely automatic maintenance, low power consumption. Design features fully described: capacities, dimensions given. Capacities listed up to 240,000 cfm. *American Air Filter Co., Inc.*



13—Electric Precipitators

Five fundamental engineering factors governing the success of precipitator installations are fully described and illustrated in a 22-page booklet, "Buell SF Electric Precipitators." Factors include positive gas flow control, uniform electrode emission, rapping method, mechanical construction. *Buell Engineering Co.*



14—Miniature Cyclone Dust Collectors

Cylindrical and rectangular collectors for recovery of particles down to 12 microns at 100% efficiency without use of filter media or tendency to plug. Collection applications include rotary, flash or spray dryers, high temperature recovery, and recovery of extremely fine abrasives. *Dustex Corp.*



15—Dust Collectors

New 8-page bulletin SC-15 contains complete information on the entire line of Whirlx dust collectors. Included is information on the replaceable cyclone elements and a completely new high volume, minimum space wet collector (Patent pending). Illustrations of operation and construction.

Fly Ash Arrestor Corp.



16—Centrifugal Dust Collector

Improved design of the Norblo High Efficiency Low Static (H.E.L.S.) centrifugal dust collector includes deep body and improved proportions and does away with dampers frequently used to overcome back pressure, according to 4-page bulletin 104-3. Capacities and dimensions are listed.

Northern Blower Co.



17—Dry-Type Air Filter

Bulletin B-1300-3 describes the new HP-2 convenient, disposable, dry-type filter for use wherever extra air cleaning efficiency (over 35% atmospheric) is required. Included is chart of performance data, capacity, dimensions, and weights. How to change filter is shown in series of pictures. Other pertinent information.

Farr Co.



18—Dust Precipitator

Bulletin 272-B describes Type D Roto-Clone dynamic dust precipitator. A dry dust collector which combines in one compact unit the functions of exhaustor, dust separator, and storage hopper. Available in twelve sizes, from 150 to 15,500 cfm. Bulletin gives information on various arrangements of the Type D.

American Air Filter Co., Inc.



19—Air Filters

Bulletin 248-C describes the Model B Roll-O-Matic automatic renewable-media air filter. New design of established product; now shipped in compact cartons, cuts installation time, permits easier storage on job site. Media reinforced for greater strength. Improved drive. Galvanized construction.

American Air Filter Co., Inc.



20—Glass-Asbestos Air Filter

"The Amazing Story of the Absolute Filter," 8-page bulletin 106C, gives ratings for new glass-asbestos medium with efficiency of 99.97% on 0.2 micron particles. Developed from filter originally designed for Atomic Energy Commission and now used for critical air-cleaning problems in industry.

Cambridge Filter Corp.



21—Fly Ash Dust Control

Bulletin V-100 introduces the Verticone conditioner for fly ash dust control or for unloading of dusty materials from bins and silos. The Verticone also provides first practical means of dust-free unloading of cyclones, bag filters, and electrostatic precipitators. Units available up to 200 tons per hour capacity.

Johnson-March Corp.



22—Cyclone Dust Separators

Bulletin sheets describe several models of cyclone dust separators, contain photographs of actual installations, multiple rating tables, specifications, floor space requirements, and dimensional drawings. Sheets are printed in two colors. Explain the use of after-filter where air is to be recirculated.

Torit Manufacturing Co.

AIR CONDITIONING, HEATING, AND VENTILATING



23—Turbulator Units

Air-conditioning consultants and building managers will be interested in the new line of turbulators for zone control of air conditioned buildings. Anemostat turbulators are high-capacity 800 to 7000 cfm units with special air valves and mixing vanes built as a package, for installation in a high-velocity system.

Anemostat Corporation of America.



25—High Velocity Data File

A new high velocity data file is designed to help the air conditioning industry utilize the advantages of high velocity air transmission and distribution. It discusses what high velocity is, what it can do and where it should be used, duct design, duct construction, and temperature control.

Barber-Colman Co.



24—Wall and Roof Exhausters

This sixteen-page catalog covers Ammerman's AirXpeler. Catalog is divided into four sections. Section A discusses exhausters—wall or roof mounted, direct driven. Section B, exhausters—roof mounted, power operated, and belt driven; Section C, dampers—back pressure, shutters, and louvers; Section D, fans.

Ammerman Co., Inc.



26—Air Conditioning, Refrigeration

Bulletin RS2D covers the entire line of air conditioning and refrigeration products. Range of sizes, specifications, and general description is given for each item. Items covered are packaged air conditioners (air and water cooled), packaged liquid chillers, room air conditioning coils, and others.

Curtis Manufacturing Co.



27—Water Chillers

Loose-leaf catalog in 3-ring binder gives complete information on the Arkla-Servel absorption-type water chillers. Consists of bulletins on application data and installation and start-up data. Also included is section of design aids which show wiring diagrams, schematics, chiller templates, and piping templates. Arkla Air Conditioning Corp.



28—Exhaust Fans

Peerless catalog 230 covers the line of exhaust fans for industrial and commercial use: vertical and horizontal attic fans; duct fans; propeller-type roof ventilators; and direct-drive high-speed radial blade and pressure blowers. Automatic louvers for walls, ceilings, commercial and industrial penthouses. Peerless Electric Co.



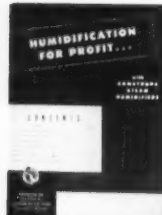
29—Refrigerant Evaporators

Selection data is provided for a line of refrigerant evaporators designed for cooling liquids. These evaporators are constructed with many new features including a new inner-fin tube which triples the heat transfer surface. Bulletin EV-159 includes dimensions for all models, selection procedure, and other data. Bell & Gossett Co.



30—Cleanable Cooling Coils

Bulletin R-50 describes and illustrates Aerofin type R removable-header water coils. These are cleanable-tube extended-surface coils for cooling air with water. Principal advantages are easy cleaning of tubes and positive drainage. Engineering data for various pass arrangements are given to assist in selection. Aerofin Corp.



31—Humidification Data

"Humidification for Profit", 16-page bulletin 5001, gives data showing how relative humidity affects hygroscopic materials, health and comfort, and formation of static electricity. Schematic diagrams and sectional drawings demonstrate operation of electric- and air-operated steam humidifiers. Armstrong Machine Works.



32—All-Aluminum Ventilators

Twenty-page technical manual contains helpful information in planning ventilation for commercial, industrial, school, and institutional buildings. Lists a complete line of low-silhouette, all-aluminum ventilators in capacities to 38,350 cfm. Also includes a new prefabricated curb for roof ventilators, in 12 sizes. Loren Cook Co.



33—Unit and Blast Heaters

Catalog 956 describes GRID cast iron steam heat transfer surface unit heaters, blast heaters, and radiators. Describes and illustrates one-piece construction. Included are air distribution charts, heating capacities, conversion tables, and specifications. This four-section catalog with tab index is well illustrated. D. J. Murray Manufacturing Co.



34—Industrial Air Conditioner

Bulletin 122, 8 pp., illustrated, describes methods to obtain control of air properties with accuracy of 1% in R.H. and 1 F in temperature (up to 140 F dew point) with compact high capacity apparatus for industrial applications. It is entirely independent of the use of moisture-sensitive instruments. Niagara Blower Co.



35—Air Conditioning Equipment

Engineering catalog with illustrative and descriptive information and complete selection data on central plant conditioners, multizone conditioners, sprayed coil units, heating-ventilating units, cooling and heating coils. This catalog is notebook type and is index tabbed for easy and quick use. Thermal Engineering Corp.



36—Electric Unit Ventilator

New publication 11-2 features the "Nesbitt Year-Round Syncretizer," an air conditioner that sets a new standard of classroom comfort in schools and colleges. Colorful, 16-page catalog describes the operation of the cost-saving Nesbitt year-round heating, ventilating, and air conditioning system. John J. Nesbitt, Inc.



37—Bifurcator Fans

Catalog DB-37-55, 16 pages, describes operation of the bifurcator fan, a split-housing fan that exhausts hot, corrosive, and flammable fumes. Use of the bulletin makes fan selection easy since it gives full data on fan laws and static pressure, velocity pressure, and friction. DeBothezat Fans, Division of American Machine & Metals, Inc.



38—High Velocity Air Valve

Described and illustrated in Pneumafol, new high velocity air valve that uses no motors or linkage mechanism. Unique pneumatic actuation, positive operation by 15 psi system, adaptability to dual duct systems, other features, are described. Isometric drawings show pneumatic function. Dimensions, capacities. Connor Engineering Corp.



39—Wall Louvers

Bulletin SPV-17B describes and pictures 39 standard sizes of adjustable wall louvers, fixed louvers, combinations of the two types, and automatic units. Louver operators, screens, installation and construction specifications are also covered. Special louvers to your specifications can be supplied promptly. Burt Manufacturing Co.



40—Air-Cooled Condensers

Catalog 384 describes Acme Tubaire air-cooled condensers. The nineteen models cover the widest possible range of applications. These air-cooled units keep installation and maintenance costs low. Capacities range from 3 to 100 tons. Selection information, coil and fan data, dimensions, weights, and specifications. Acme Industries, Inc.



41—High-Velocity Air Conditioning

Four-page bulletin 1312 covers the Hi-Static Multitherm unit, developed principally for high-velocity, conduit type air conditioning systems. Available in seven sizes, covering a volume range of about 2500 through 22,000 cfm, and suitable for systems with a static pressure of 8-in. wg maximum. Specifications. *Clorage Fan Co.*



42—Cooling Towers

Towers For Industry — bulletin 4.9.080A — discusses the structural and mechanical features of Pritchard induced draft, counter flow cooling towers. Drawings include cross-sections, a cutaway, and other detailed drawings. Photographs accompany drawings of most features. Dimensional diagrams are shown. *J. F. Pritchard & Co. of California.*



43—Roof Exhausters

Completely new 4-page bulletin SC-88 describes in detail the original acoustically insulated Sonotrol curl. Dimensional charts for standard Domex and Dynafan roof exhauster sizes are listed along with drawings for flat or single pitched installation. Offers information on other factory fabricated curbs. *Penn Ventilator Co., Inc.*

44—Air Diffusers

Catalog R-107 describes the Agitair line of square and rectangular air diffusers with built-in diffusing vanes which provide 64 active air jets to every square foot of the unit. Diffusers are custom-made in unlimited air pattern arrangements. Contains complete performance, selection and application data. *Air Devices Inc.*

45—Central Station Air Conditioners

Catalog AC-1001 describes the new line of packaged CEN units for water cooled and evaporative condensers for commercial, institutional, and industrial applications. Consisting of three basic sections, conditioner section, compressor section, and condensing section, models are available ranging from 7½ through 60 hp. *National-U. S. Radiator Corp.*

46—Double Duct System Units

Bulletin 371D describes and illustrates a new line of room terminals for high velocity double duct air conditioning systems. Units in six sizes feature constant volume control, high sound attenuation, uniform temperature across entire width of discharge, and five methods of installation. Selection data given. *Carrier Corp.*

47—Space Heaters

Twelve-page bulletin describes OG-4 new design space heater. Gas, oil, or combination dual fuel burners with push-button changeover. Output from 280,000 Btuh on up. Rugged construction with completely enclosed burner adaptable for space heating, ventilation, make-up air, process heating, air conditioning. *Lennox Industries, Inc.*



48—Unit Ventilators

The new Nesbitt Electric Syncretizer Unit Ventilator is featured in publication 10-5T. This newly developed unit for heating and ventilating classrooms uses electricity as a fuel. Catalog illustrates and describes all the components of this new type Syncretizer. Also given are complete heating capacities and details. *John J. Nesbitt, Inc.*



49—Packaged Liquid Chillers

Catalog AC-233 describes complete line of factory packaged liquid chiller units with hermetic type compressors from 3 through 30 hp. Gives engineering details as well as complete capacity data in tabular form on each unit. Cutaway photographs show construction and operation. Schematic wiring diagrams. *Chrysler Corp., Airtemp Division.*



50—Power Roof Exhausters

Bulletin BDS-6 contains full descriptive material on Gallaher Series 5 belt driven Air-Van power roof exhausters. Included in bulletin are rating tables, dimensional tables, material specifications, and curb details. Units have capacities from 3000 to 65,000 cfm and will handle static pressures to 4 inches. *Gallaher Co.*



51—Industrial Fans

Bulletin 585 describes newly designed general industrial fans incorporating advanced aerodynamic techniques. The new fan combines improved efficiency with all the advantages of the flat radial blade design. Three wheel types are offered; diameters from 10 to 78 inches; capacities from 203 to 72,865 cfm. *New York Blower Co.*



52—Axial Flow Fans

Bulletin 740 describes Type CB belt-driven axial flow fans for use in power plants, auditoriums, stores, factories, or wherever large volumes of air must be moved at relatively low noise levels and moderate pressures. Available in four sizes from 42 to 72 inches. Certified ratings from 14,200 to 58,100 cfm. *Robbins & Myers, Inc.*



53—Roof Ventilators

New 16-page Colt catalog describes clear opening "CO" ventilators. Fit any type of roof for quick release of concentrated process heat — with special attention to fire control through use of automatic fusible link louvers. Specific installation instructions included. Catalog also available on "CP2" inlet ventilators. *Colt Ventilation of America, Inc.*



54—Remote Air-Cooled Condensers

Bulletin 7017 provides engineering data for "LRCU" large remote air cooled condensers. Diagrams and capacity curves fully cover the Dunham-Bush line with additional rating specifications, construction details, and installation data. A table of national summer weather conditions is included. *Dunham-Bush, Inc.*



55—Power Roof Exhausters

Bulletin 58-HC illustrates features of new Jenn-Air Hi-D centrifugal belt drive all-aluminum power roof exhausters. Offered in 46 sizes with capacity ranges from 1085 cfm to 21,400 cfm featuring ball-bearing totally enclosed motors and full ball-bearing tubular drive assemblies. Bulletin is illustrated.

Jenn-Air Products Co., Inc.



56—Space Heaters

Bulletin A1/2.1a describes the newly redesigned line of heavy duty space heaters for gas, oil, or dual fuel firing. The line includes 10 sizes of heaters, 400,000 to 2,000,000 Btu; all can be installed for up-flow, down-flow, or horizontal discharge and can be used with or without ducts. Bulletin gives all data.

Reznor Manufacturing Co.



57—Air Distribution

"Westinghouse Puts Air To Work" is a new booklet which covers the treatment and distribution of air and the products to do the job. This booklet is well illustrated and has sections on air handling, air conditioning, air heating, and electronic air cleaning.

Westinghouse Electric Corp.
Sturtevant Division.



58—Roof Ventilators

Bulletin CAM-3 describes Swartwout Airmovers, which act in a double capacity, that of high capacity gravity roof ventilators and skylights. Included are cutaway photographs showing construction, capacity tables, and installation instructions. One section shows how to calculate illuminating capacities.

Swartwout Co.



59—Space Heaters

Bulletin PW-260 describes a new concept of curtain wall function, room-by-room air conditioning, an integral part of the Lupton curtain wall system. This is a true perimeter type system affording individual room control. It is a space saver and is easily installed. Includes capacities, dimensions, and specifications.

Michael Flynn Manufacturing Co.



60—Curtain Wall Air Conditioners

Catalog 2659 illustrates and fully describes how to effectively space heat in buildings with high ceilings. Sixteen pages include technical data, mounting heights, spread circle diameters, unit capacities of 30 sizes, specifications, and dimensional drawings. Complete charts, tables, and graphs included.

Young Radiator Co.



61—High Temperature Water Boilers

Folder describes the new "Flo-Kontrolld" forced circulation high temperature water boiler. Requires less space than steam boiler, smaller piping, no traps, no condensate equipment, fewer valves and fittings. Basically, it's about as simple as a residential hot water heating installation. Diagrams show typical installations.

Boiler Engineering & Supply Co., Inc.



62—Cast Iron Boilers

Twelve-page catalog of commercial and industrial cast iron gas, oil, and stoker boilers. Net gas ratings to 3105 MBH (119.5 hp), net oil ratings to 2942 MBH (113.2 hp); ratings approved by Institute of Boiler & Radiator Manufacturers. Catalog contains description, ratings, dimensions, and drawings.

Weil-McLain Co.



63—Air-Cooled "Unicon" Condensers

Bulletin U-459 introduces the Kramer horizontal face Unicon (vertical air flow) as a regular catalog item. Kramer's remote-type air-cooled Unicon condenser has no tonnage limitation and it eliminates all water problems. Bulletin includes performance data and dimensions on 8 models from 17 to 73 tons.

Kramer Trenton Co.



64—Multi-Space Air Conditioners

Catalog EM-59-2114 describes revolutionary induction unit system of air conditioning for multi-story, multi-space buildings. System especially suited to curtain wall type construction or building with large glass area. Includes system features, cost comparison, and diagram of system piping.

York Corp.



65—Packaged Liquid Chillers

Bulletin R4C covers a new line of packaged liquid chillers with multiple cylinder hermetic compressors. Chillers are available in sizes 10 tons thru 100 tons. All units are shipped completely assembled and are factory engineered and tested before shipment to insure proper performance. Tables of capacities.

Curtis Manufacturing Co.



66—Water Coils

Catalog 53C8a covers the Recold line of water coils, which have been carefully designed, rated, and manufactured to the very highest standards. A complete variety of sizes is available. This catalog features a very comprehensive rating chart for easy coil selection by the consulting engineer specifying equipment.

Recold Corp.



67—Fuel Engineering Data

Prepared as a special aid for designers of heating plants, this 12-page Fuel Engineering Data booklet describes recommended methods of sizing boilers and stokers for heating and process steam loads. Information includes five tables to simplify calculations and selection of equipment.

Bituminous Coal Institute.



68—Air Make-Up Unit

A new air make-up unit designed to temper outside air and supply it in sufficient quantities to eliminate negative pressures is described in bulletin 850. Make-up air units are available in seven unit arrangements in six sizes from 24 to 54 inches, with air capacities ranging from 4000 to 33,000 cfm.

Aerovent Fan Co., Inc.



69—Cooling Coils

Bulletin 11 contains complete information on Marlo cooling coils, and includes schematic charts and rule permitting direct graphical coil selection in seconds. One chart provides all data for a particular application, including proper refrigerant or chilled water temperatures. Well illustrated.

Marlo Coil Co.



70—Air Handlers

Catalog 382A describes Acme air handlers. This central station type unit is offered in 30 models and in sizes from 665 to 19,200 cfm for both horizontal and vertical arrangement. A complete line of accessories and optional equipment is listed. Included are dimensions, capacities, and specifications. Fully illustrated.

Acme Industries, Inc.



71—High Velocity Ducts

Special 24-page manual contains 11 pages of performance tables; explains step-by-step computations on two work sheets for 10-story office building; shows schematic layouts; information on duct construction and duct insulation. Also included are tables of static regain and transition loss and elbow losses.

Anemostat Corporation of America.



72—Multi-Zone Air Conditioning

First complete reference data on design and layout for multi-zone installation practice. Text, 24 pages, covers construction details, design procedures, basic air distributing schemes, air handling apparatus, budget costs, automatic control, winter and intermediate operation, specifications. Valuable for the designer.

Buensod-Stacey, Inc.



73—Aircraft Hangar Heating

Bulletin HA-100 describes the L. J. Wing aircraft hangar heating system. Listed, with drawings, are the problems encountered in heating hangars followed by a spread showing how these problems are solved. Features of the system are described and pictured. Typical installations pictured. Specifications given.

L. J. Wing Manufacturing Co.



74—Packaged Liquid Chillers

Catalog AC-225 describes complete line of factory packaged liquid chiller units with open type compressors from 10 to 125 hp. Gives engineering details on unit components as well as complete capacity data in tabular form on each unit. Cutaway photographs show construction and operation. Required specifications.

Chrysler Corp., Airtemp Division.



75—Centrifugal Roof Ventilators

Bulletin SDA-220 deals with the Peerless belt and direct drive centrifugal roof ventilators which have recently been added to the Peerless roof ventilator line. Features, construction details, performance data, dimensions, and specifications are presented.

Peerless Electric Co.,

Fan and Blower Division.



76—"Hermetic Turbopak"

Catalog EM59-2102 provides a complete description of the New York Hermetic Turbopak with engineering and selection data covering units of 65-130 tons capacity. Additional units up to 600 tons. Complete factory assembly of the unit includes piping, wiring, insulation, decorative casing, and electronic controls.

York Corp.



77—Power Roof Exhausters

Catalog gives full details on new Super Air-Van line of power roof exhausters in reinforced Fiberglas, including features, rating tables, dimension tables, and specification data. Physical and chemical advantages of Fiberglas units are discussed. These include quietness, corrosion resistance, strength, light weight.

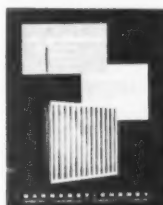
Gallaher Co.



78—Scotch Type Packaged Boilers

The Burnham scotch type packaged boiler incorporates a proven design with performance and capacity-tested boiler and burner for oil, gas, or combination gas and oil firing. Shipped as a complete unit, it is available in 8 sizes, certified ratings from 4740 to 12,750 sq ft EDR steam. Engineering details given.

Burnham Corp.



79—Charcoal Purification

Comprehensive bulletin describes activated charcoal purification cells and how they can save heating and cooling costs by permitting recirculation of air. Installation and construction details, air capacities, and resistances to air flow. Outlines charcoal reactivation services and testing procedures.

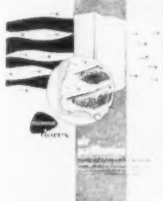
Barnebey-Cheney Co.



80—Air Conditioners

Bulletin 81P-11 gives equipment data on Arkla-Servel's absorption-type, gas operated, Sun Valley air conditioners. Included is complete information such as: specifications, dimensions, capacity data, condensing water data, and wiring diagrams. Also given is information on duct work and various applications.

Arkla Air Conditioning Corp.



81—Air Purification Equipment

Bulletin 108A describes and illustrates Dorex activated carbon air purification equipment, C Cells and H Canisters. Data on equipment selection, installation, application is provided. Also given is information on unique Dorex replacement service. Discussions of activated carbon and conditions for proper purification.

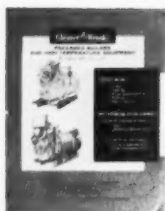
Connor Engineering Corp.



82—Air Turning Vanes

Bulletin, F 7912-1, incorporates complete information on Uni-Flo Airturms, aerodynamically correct turning vanes. The bulletin includes accurate pressure loss data. True elbow losses throughout the system can be determined easily. Simple installation is also illustrated in this brochure. Cutaway photos show construction.

Barber-Colman Co.



83—Packaged Boilers

Catalog AD 167-8-58, packaged boilers and high temperature equipment, describes the Cleaver-Brooks line of boilers with unique hinged doors and fully automatic controls. Advantages of four pass, forced draft design, 5 sq ft of heating surface per boiler horsepower. Oil, gas, or combination fired units are described. *Cleaver-Brooks Co.*



84—Exhaust Fan Ventilators

Bulletin SPV-18 details Burt free exhaust fan ventilators, designed for extremely fast removal of contaminated air. Air-shaft dampers open automatically to vertically exhaust an unrestricted column of air, and close to thoroughly weather-proof unit when motor is shut down. Capacities are available to 75,550 cfm. *Burt Manufacturing Co.*



85—Gas-Fired Air Make-Up Units

Bulletin 870 illustrates and describes new gas-fired air make-up units for natural, mixed, manufactured, and propane gasers. Four unit arrangements in four sizes from 36 to 54 in. for various capacities, Btu ratings, and pressure conditions. Self contained package for easy installation. Safe, dependable operation. *Aeroven Fan Co., Inc.*



86—"Comfort Curtain" System

An eight-page booklet of architect sketches showing different applications of the Lennox Comfort Curtain system for heating, ventilating, and air conditioning classrooms. An attractive two-color booklet, this brochure shows heater rooms and heating equipment integrated into the design of schools and libraries. *Lennox Industries Inc.*



87—Single Duct Air Conditioners

Bulletin 37E describes and illustrates a new line of room terminals for high velocity single duct air conditioning systems. Units in three sizes from 50 to 700 cfm feature reheat coil suitable for hot water or steam. Rate of flow of either may be controlled at unit manually or automatically. Selection data. *Carrier Corp.*



88—Packaged Air Conditioning Units

Catalog AC-1012 illustrates and describes a new line of packaged units available in sizes ranging from 3 to 20 tons, water cooled or air cooled. Each unit is pre-tested for immediate, low-cost installation in homes, restaurants, super markets, factories, and other applications. Catalog gives all specifications. *National-U. S. Radiator Corp.*



89—Roof and Wall Ventilators

Attractive 12-page illustrated bulletin DMXA-88 contains complete information on the entire line of Domex roof and wall exhausters. Illustrations, capacity tables, and dimensional data are furnished for convenient selection. Basic instruction features reveal direct air discharge design, spun scroll inlets. *Penn Ventilator Co., Inc.*



90—Hot Water Circulators

Bulletin No. 1551A describes a complete line of hot water circulators, valves, fittings, specialties, and controls. Typical installation diagrams, pressure drop tables, and complete product data. Vari-Flow controls that eliminate need of indoor thermostats and automatically balance heat output of system are explained. *Dunham-Bush, Inc.*



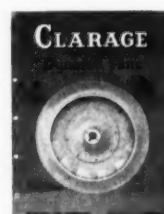
91—Packaged Industrial Fans

New bulletin 586 describes packaged industrial fans with radial flat blade wheels. Available in sizes 141 through 361. Economically designed, they feature one-man motor installation and removal. Motor and belt pull are on vertical centerline. They are easily rotatable or reversible in the field. *New York Blower Co.*



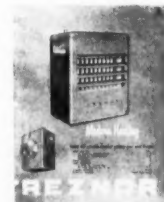
92—Cooling Towers

"LoLine" cooling towers for air conditioning, industrial service are detailed in this new 16-page bulletin, 5.1.902, Rev. 4. Available in two heights, units have low silhouette, high performance, attractive appearance. Literature contains engineering data, dimensional drawings, specifications, tables for both series. *J. F. Pritchard & Co. of California.*



93—"Dynafoil" Fans

Catalog 859 describes a new line of highly efficient, quiet airfoil blade fans. Dynafoil fans are particularly applicable to mechanical draft and heavy duty applications, such as industrial processes, conduit air conditioning, and tunnel ventilation. Various arrangements and panel openings pictured. Dimensions given. *Clamage Fan Co.*



94—Industrial Heating Equipment

Bulletin A1/1.2A covers a complete line of gas-fired commercial and industrial heating equipment with capacities from 25,000 to 2,000,000 Btu. Includes fan and blower type suspended unit heaters, heavy duty space heaters, and sectional duct furnaces with matching cabinet blowers. Dimensions, specifications. *Reznor Manufacturing Co.*



95—Direct Expansion Coils

Catalog 52C8a covers the entire range of direct expansion coils for air conditioning applications with the most complete set of ratings published. Ratings show capacities for coils when wet, partially dry, or completely dry — depending on coil conditions. This up-to-date data of value to the consulting engineer. *Recold Corp.*



96—Perforated Air Diffusers

Catalog P-200 describes the new series of adjustable and non-adjustable Perfair perforated air diffusers which incorporate interchangeable cores available in unlimited air pattern arrangements for 1-2-3-4 way blows. The catalog contains complete engineering, application, and installation data. *Air Devices Inc.*



97—Packaged Steam Generators

Bulletin VWA illustrates and describes a series of 10 packaged water tube steam generators with capacities from 1500 to 20,000 pounds of steam per hour. Includes details of construction, testing, and over-all dimensions. Units may be fired with factory installed gas, oil, or combination Webster burners.

Webster Engineering Corp.



98—Roof Ventilators

Bulletin 680-C describes Sky-Blast power roof ventilators. Weatherproof features include corrosion-proof, aluminum alloy propeller; nonclogging dampers and rain-shed; one-piece all welded base hot-dip galvanized after fabrication. Automatic fire-vent release. Sizes to 60 inches; air deliveries to 78,800 cfm.

Robbins & Myers, Inc.



99—Air Mixing Units

Catalog DD-4 describes dual-duct air mixing units and accessories for automatic control of high-velocity air conditioning systems; permits wide conditioning variations even for adjacent spaces. Automatic control feature maintains constant volume despite variations in static pressure. Units are pictured, diagrammed.

Buensod-Stacey, Inc.



100—Central Air Conditioning

Catalog 7558 gives performance, capacity, and dimensional data required to select proper size unit for given installations as well as selection example. Capacities range from 700 cfm to 28,000 cfm. Horizontal and vertical arrangements offered in 10 sizes—multizone units in 9 sizes, selection of 2 to 21 zones.

Young Radiator Corp.



101—Power Roof Exhausters

Bulletin 58-HA describes the new addition of the all-aluminum belt-driven Hi-D axial power roof exhauster. Available in 24 models in capacity ranges from 3330 cfm to 28,650 cfm and equipped with totally enclosed ball-bearing motors and full ball-bearing tubular drive assembly.

Jemm-Air Products Co., Inc.



102—Hot Water Boiler

Bulletin HCC-2, a 20-page brochure, describes and illustrates the design, construction, advantages, and economies of the C-E LaMont controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Comparison table of heat content.

Combustion Engineering, Inc.



103—Packaged Boilers

Type C Superior Packaged Boilers for capacities from 20 to 350 bhp are described in this 3 color catalog. Unusually compact, providing economies of installation, the Type C has four-pass design, 5 sq ft of heating surface per bhp, and induced draft. Data and dimensions for units to burn oil, gas, or both.

Superior Combustion Industries, Inc.



104—Unit Ventilators

New unit ventilator control application loose-leaf file describes in detail control cycles for all leading types and models of unit ventilators. The booklet includes new face and by-pass units, and incorporates complete set of specifications and diagrammatic drawings for each. Tab permits easy reference in file.

Barber-Colman Co.



105—Water Boilers

Catalog RW-10-1 describes the new line of Fitzgibbons boilers suitable for working water pressures up to 125 psi. These "RW" type boilers are rated in accordance with the January 1, 1959 revisions of the S.B.I. Code. Rating, dimensional data, and drawings showing thermal action included.

Fitzgibbons Boiler Co., Inc.



106—Tank Ventilation

Bulletin DT-7-52 deals with design of lateral tank ventilation systems, using bifurcator fans. Includes fume removal information in problem-solution form, detailed tank diagrams, fan wheel material selection charts, and 10 graphs for calculating required CFW.

DeBothezat Fans, Division of American Machine & Metals, Inc.



107—Packaged Air Conditioners

Bulletin TC-458 describes the factory packaged and run-in ready to operate Kramer Trenton Company high and low side systems, now including a Kramer hermetic compressor. Offered in 1 to 20 ton models, these compressors can be used in multiples for both indoor and outdoor applications.

Kramer Trenton Co.



108—Scotch Type Steel Boilers

Catalog of Burnham scotch type steel boiler data furnishes design and engineering information regularly required by architects, engineers, and the heating industry. Gives S.B.I. ratings, lbs. steam per hour—all pertinent dimensional data for complete specifications. Catalog is completely illustrated.

Burnham Corp.



109—Gravity Ventilators

Colt catalog, 20 pages, describes new line of "SR" and "O/SR" gravity ventilators. Special airfoil shape increases velocity of extraction. Weatherproof, adjustable center gives reserve extraction ability for exceptionally hot days, is unique in gravity ventilators. Catalog fully illustrates and details new line.

Colt Ventilation of America, Inc.



110—Roof Ventilators

Catalog FA1 describes the all new Fiber-Aire roof ventilators by Swartwout. Here is a new fiberglass centrifugal unit (belt or direct) that actually absorbs noise, setting a new standard for ventilator quietness. Virtually impossible to dent or break and unaffected by salt spray, weather, fumes, and most chemicals.

Swartwout Co.



111—Steam Coils

Bulletin M-10 contains information on new Marlo Evntemp distributing steam coils, for modern heating systems using modulating or two-position controls. Unique design provides even temperature throughout entire face area, even when partially throttled during light loads, with precise control.
Marlo Coil Co.



112—Air Purification

Bulletin T-264 describes types of equipment available for air purification by the "Black Magic" of activated charcoal. Details and specifications concerning portable purifiers, disposable filters, wall units, heavy duty cells, and cabinet purifiers. Charcoal increases comfort and safety in living and working spaces.
Barnebey-Cheney Co.

ELECTRICAL EQUIPMENT



113—Motor Controls

This condensed catalog lists, with prices, all commonly used motor controls up to and including size 4 rating. Standard enclosures are shown. Also included are various types of starters, transfer switches, control relays, push button stations, and other controls. Catalog is illustrated, includes list of renewal parts.
Allen-Bradley Co.



114—Insulated Cables

New bulletin 1028 contains information on Anhydrex insulated cables for power transmission, control, and communications circuits operating up to 2000 volts. Protective coverings include neoprene, PVC (Plastex), interlocked armor (Condex), lead, and the new impermeable, flexible metallic sheath (C-L-X).
Simplex Wire & Cable Co.



115—"Rocker-Glo" Switches

Illustrated four-page brochure describes new Rocker-Glo switch by Pass and Seymour. It has a luminous button and operates silently. Available in 15 or 20 amp., 120/277 volts ac. It has easy-to-wire pressure or screw terminals. Comes in Despard type with strap or Despard interchangeable.
Pass and Seymour, Inc.



116—"Telemand"

Bulletin 5047-1A covers design and operational features of newly developed motor operated device, trade named Telemand, which allows remote control of opening, closing, or resetting molded case circuit breakers. Photos, application, operational drawings, and installation data provided.
I-T-E Circuit Breaker Co.



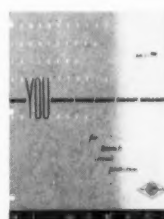
117—"Varidrive" Motors

Bulletin F-1797, "Variable RPM's Control Production Tempo—U.S. Varidrive, the Miracle Motor," 16 pages, full color, describes combined motor and integral V-belt drives providing stepless speed changes 2 to 10,000 rpm, 1/4 to 75 hp. Space-saving, vertical or horizontal in many models.
U. S. Electrical Motors, Inc.



118—Interrupter Switches

Bulletin 1610A, 24 pages, describes and illustrates arc-chute type interrupter switches, fused and unfused, for switching feeder circuits. Usually metal enclosed, switch can be wall mounted, free standing, or grouped with common bus. Switches can close in on moderate faults.
*R & IE Equipment Division,
I-T-E Circuit Breaker Co.*



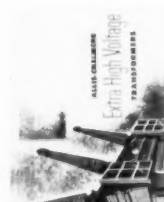
119—Circuit Breakers

"What You Should Know About Circuit Breakers for Branch Circuit Protection," 16-page manual 101, describes ways of protecting your client from fire, equipment damage, excessive wiring costs, and needless circuit interruptions. How hydraulic-magnetic circuit breakers provide this protection is pointed out.
Heinemann Electric Co.



120—Saturable Reactors

Bulletin 658 illustrates and describes Sorgel saturable reactors to control, regulate, and vary electric power from 1 kva to 3000 kva, for various manufacturing processes, either manually or automatically. Also includes a questionnaire form to fill in to obtain complete information for any application.
Sorgel Electric Co.



121—Power Transformers

Extra high voltage power transformers are the subject of 16-page booklet O1B8771. Developments leading up to the newest units are discussed briefly. Test facilities, manufacturing facilities, and testing methods are illustrated. Included are impressive photos of extra high voltage transformers in operation.
Allis-Chalmers Manufacturing Co.



122—Quick-Connect Terminals

Catalog 320 illustrates over 300 quick-connect terminals and splices for appliance, automotive, and other equipment wiring. The booklet contains test data, dimensions, and applications. Complete details of high speed pneumatic and electric wire terminators for mass production of leads and harnesses included.
AMP Inc.



123—Crouse-Hinds Facilities

Twelve-page pictorial bulletin 2706 briefly describes manufacturing facilities and electrical products of Crouse-Hinds. Emphasis is on variety of equipment in the four product lines: Condulet electrical equipment, floodlights, aviation lighting equipment, and traffic control. Photos show products in use.
Crouse-Hinds Co.



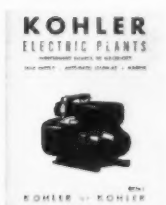
124—Electrical Outlets

Sixteen-page booklet, "Electrical Outlets Wherever You Need Them," gives complete details on RLC duct floors, a new development which provides 100 percent electrical flexibility for buildings at a remarkably low cost. The illustrated booklet is published by the Concrete Steel Reinforcing Institute.
Concrete Steel Reinforcing Institute.



125—Electrical Insulation

Twelve-page, two-color bulletin describes in detail Butyl rubber. Many applications of this rubber that stays "alive" are pictured. Many comparison graphs show effect of heat aging, electrical stability, shock absorption, sound damping, tear resistance, abrasion loss, gas permeability, and low temperature flexibility.
Enjay Co., Inc.



126—Electric Plants

Catalog KEP56-1, 24 pages, shows the line of Kohler electric plants used as an independent source of electricity for sole supply and for automatic standby when central station power fails. Sizes range from 500 w to 50 kw, gasoline and diesel. Battery charging units in 6, 12, 36, and 140 v capacity are described.
Kohler Co.



127—Power Cables

Catalog J-942 describes a new development consisting of three single conductor, parallel-laid, insulated, 5 kv power cables, supported from a messenger by a plastic spacer. Method combines the advantages of both open wire lines and insulated cables. Data on design, operation, installation, splicing, and tapping.
John A. Roehling's Sons Corp.



128—Metal-Clad Switchgear

This newly published brochure by S & C Electric Company on the subject of metal-clad switchgear contains numerous photographs and one-line diagrams of many typical S & C switchgear units for industrial high voltage power distribution. Sizes from 2.4 kv through 34.5 kv are available.
S & C Electric Co.



129—Plastic Conduit

Descriptive two-color brochure covers four types of plastic conduit for electrical and communications lines (underground or underwater), single or multiple applications. Sizes 2 to 6 in. are featured, with use data, and illustrated assembly methods emphasizing installation cost reductions up to 35%.
Southwestern Plastic Pipe Co.



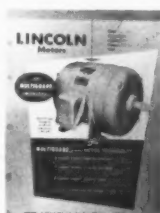
130—Electric Controls

Engineering reference catalog 18A contains a complete line of standard Zenith electric controls and timing devices. Photos, diagrams, engineering data, and prices on automatic transfer switches, magnetic contactors, remote control switches, program clocks, automatic reset timers, cycle timers, and special controls.
Zenith Electric Co.



131—Fusible Service Equipment

Bulletin 1-215 describes Federal Pacific's new line of Type SF fusible service equipment. Catalog covers stab-in units, enclosures, features, and accessories. Primary features are flexibility, compactness, and ease of installation. System's 10 enclosures and 5 stab-in units replace 208 previous devices. Illustrated.
Federal Pacific Electric Co.



132—Motors

Bulletin 6100.1 describes a revolutionary idea in motor design. The windings and insulation of these open type motors are encapsulated in a thermosetting plastic which is extruded throughout the windings and around the coil ends. The windings are protected against chemical, water, mechanical, and thermal damage.
Lincoln Electric Co.



133—Electrical Fittings

"O.Z. Terminating and Splicing Fittings for Interlocked Armor Cable," 36-page engineering bulletin 135A, gives complete specifications, dimensions, cutaway drawings, photographs, and installation instructions. Prices and weights also are given for each item, along with ordering data and available materials.
O. Z. Electrical Mfg. Co.



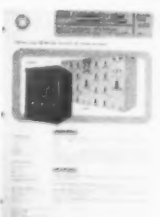
134—Conduit Fittings

Loose-leaf catalog 135 has been prepared to provide all the technical information you need to select the right conduit fittings, cable terminators, cast iron boxes, and solderless connectors for each of your electrical installations. It includes a comprehensive index and a section of useful engineering data.
O. Z. Electrical Mfg. Co.



135—Turbine Pump Motors

A new turbine pump motor designed especially for short-coupled industrial pumping is described in bulletin E-1975, "U.S. Unibase Turbine Pump Motors." New microset coupling avoids disassembly for pump fine adjustment. Motor, base, coupling all are factory aligned, tested package.
U. S. Electrical Motors, Inc.



136—Indoor and Outdoor Switchgear

Descriptive 32-page bulletin 32-150 outlines indoor and outdoor switchgear utilizing type DB De-ion drawout air circuit breakers . . . for the control and protection of power circuits especially adapted for power centers. Such switchgear widely applied in industrial plants, utility stations, and commercial buildings.
Westinghouse Electric Corp.



137—Electrical Catalog

Pocket catalog 111-PR is a pocket-sized catalog giving pricing data on all Federal Pacific's products available from distributors' stocks. Included are circuit breakers and enclosures, fusible service equipment, lighting and power panelboards, safety switches, and industrial motor control. Photos, wiring diagrams. Federal Pacific Electric Co.



138—Mineral Insulated Cable

Four-page folder, 20 Questions & Answers, answers most, if not all, of the usual questions concerning a unique wiring system, referred to by the NEC as MI, mineral insulated cable. Approved for hazardous areas, the cable is of all mineral construction, not affected by heat, moisture, sunlight, and oils. General Cable Corp.



139—Polyphase Motors

Bulletin MU-224 describes the new line of totally enclosed polyphase motors from Wagner Electric Corporation. Included are standard and explosion-proof designs in NEMA frame sizes 182 through 445US, 1 to 100 hp. Bulletin contains selection data, motor dimensions, performance curves, and ratings. Wagner Electric Corp.



140—Centralized Electrical Controls

Catalog SM-244, 16 pages, describes in detail the modern method for centralizing electrical power distribution and motor control equipment for industrial applications. It also contains suggested ideas for control specifications, and gives a simplified selector for use in control center layout and planning. Square D Co.



141—Engine Driven Plants

Four educational pamphlets deal with complicated characteristics of engine driven electric plants. M-100 describes methods of excitation; M-101 compares running hours of operation between car and electric plant; M-102 discusses engine fuels; M-103 discusses operation of electric motors with generating sets. D. W. Onan & Sons, Inc.



142—Dry-Type Transformers

This bulletin 958 describes and illustrates Sorgel Electric Company's standard line of low sound level dry-type transformers in ratings of 1/4 to 3333 kva single phase and 1 to 10,000 kva three phase, 120 to 15,000 volts, suitable for varied installations. Consultants will find the book valuable. Sorgel Electric Co.



143—Bus Duct Layout

Booklet B-4272C is designed for consultants' use in planning and selection of units for bus duct layout in commercial, institutional, and industrial buildings. Plug-in duct, outdoor feeder duct, low-impedance duct, and Life-Line Busway are fully covered. Completely illustrated with engineering and test data. Westinghouse Electric Corp.



144—Substation Arrangements

Bulletin 3025 shows in diagrams six different substation arrangements available from Moloney. Shown are single and double circuit with bus disconnects, bus and load disconnects, and bus and load disconnects and by-pass. The specific advantages of this type of substation construction are pointed out. Moloney Electric Co.



145—Circuit Breakers

Bulletin 1604-A. Fully illustrated bulletin covers new K-Line low-voltage power circuit breakers. Breaker is spring operated for quick-make manual or electrical operation. Ratings are 15 through 1600 amperes continuous; 15,000 to 75,000 amperes interrupting. Circuit breakers available for 600-v ac and 250-v dc. I-T-E Circuit Breaker Co.



146—Motor Controls

Catalog 7000, 133 pages, gives detailed technical data, dimensions, prices of a full line of motor controls. A new catalog numbering system replaces old style numbers, enables customers to write one-line order because all pertinent information is now found on a single page. Cross-indexed. Includes handy selection guide. Westinghouse Electric Corp.



147—DC Transmission

Bulletin 7313E describes in detail the high voltage dc transmission from the mainland of Sweden to the island of Gotland, a distance of 60 miles. Explains why dc transmission effects economies even when it must be converted from and to ac. Explains operation of mercury-arc converter. ASEA Electric, Inc.



148—Switch and Fuse Equipment

GEA-6623 describes the new Rollout switch and fuse equipment which is available in ratings from 2.4 kv to 13.8 kv. The rollout feature makes the equipment as accessible as a file drawer for easy inspection and maintenance. With this new load-break equipment you also get improved protection and safety. General Electric Co.



149—Wire and Cable

"Wire & Cable for American Industry," 72-page catalog, gives construction specifications for all types of wire and cable, such as: apparatus, appliance, audio, boiler room, building, coaxial, control, gasoline resistant, instrument, mining, power, railway signal, remote control, sheet lighting, and many other types. Continental Wire Corp.



150—Open Motors

Super-Seal open motors, bulletin 05-51B9040, can be used in applications formerly requiring TEFC designs. Savings are up to 60 percent. In any integral hp size, their superiority results from revolutionary new insulations. Motors with both epoxy-resin encapsulated stators and Silco-Flex insulated stators. Allis-Chalmers Manufacturing Co.

151—Fuse Interrupter Switches

Technical Bulletin TP-1610A describes arc-chute type, fused interrupter switches and their application to power switching centers for primary power distribution. Application schemes and illustrations show how power switching centers are used for switching feeder circuits.

*R&IT Equipment Division
I-T-E Circuit Breaker Co.*

152—Control Centers

Bulletin 2-2000A outlines the features and specifications of Federal Pacific's new line of control centers. Gives general features, construction, parts, and dimensions of two major components, structural sections and electrical control units. Illustrated with photos showing interior with arrows pointing to features.

Federal Pacific Electric Co.

153—Distribution System

Rome Cable's new primary distribution system, TRIMLINE, is described and fully illustrated in a new free bulletin, RCP-790. A discussion of when and where to use the system plus descriptions of its components accompany the technical data. Information on installation and sample specifications are included.

Rome Cable Corp.

154—Squirrel-Cage Motors

Bulletin MU-128 describes part winding polyphase squirrel-cage motors and two step magnetic increment starters. Available in normal torque motors, 5 hp to 600 hp, and high torque motors, 5 hp to 200 hp. Widely used for commercial refrigeration and air conditioning installations and for industrial applications.

Wagner Electric Corp.

155—Aluminum Feed-In Duct

Bulletin SD-101 describes in detail Square D totally enclosed low-impedance aluminum feed-in duct. Also explains how telescopic joints eliminate need for special lengths and demonstrates the safety, space-saving, and mounting features of Square D feed-in duct. Includes suggested specifications.

Square D Co.

156—Circuit Protection

Newly released 20-page bulletin B-7232, discusses "The Search for Perfection in Circuit Protection." Bulletin also includes complete system protection, science of circuit breaking, solenoid and pneumatic operating mechanisms, oil breakers, arc interruption, and measurement of interrupted current.

Westinghouse Electric Corp.

157—Switchgear

Bulletin 3-440 gives feature-by-feature description of most modern design switchgear. Discussed are construction and operation of 5 and 15 air circuit breakers: indoor and outdoor housing construction, compartmentation, and simplified installation and maintenance.

*Ordering information, arrangements.
Federal Pacific Electric Co.*

**158—Dimmerboard Systems**

This 24-page bulletin explains basic components of stage dimmerboard systems, as well as optional components and features. Complete description of standardized dimmerboards, plus convenient selection chart. Specifications for all types of dimmerboard systems and layout dimensions are included.

Square D Co.

**159—Dry-Type Transformers**

Bulletin 1047, Buyer's Guide to help in specifying and ordering dry-type transformers. A quick and easy-to-use single source of specifying and ordering information. Pictorial index gives basic descriptions, application information, and page numbers on which prices, dimensions, and other data are found.

General Electric Co.

**160—Synchronous Motors**

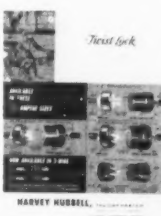
Bulletin 247 describes a line of vertical synchronous motors starting at 250 hp. The motors can be operated from standard voltages and have built-in heavy duty features. Designed for cool operation and high efficiency. Seven cut-away wash drawings show details of construction and special features.

Electric Machinery Mfg. Co.

**161—Receptacle Openings**

These charts, diagramming the approved and standardized receptacle openings and plug blade arrangements of 28 different types of polarized, non-polarized and grounding devices for 2-, 3- and 4-wire installations, are offered in 17 x 22 in. wall size and 8½ x 11 in. page size. Devices cover a complete range.

Arrow-Hart & Hegeman Electric Co.

**162—Caps and Connectors**

Bulletin H-796 describes Insulprene Twist-Lock heavy duty caps and connectors built to resist acids, oils, live steam, hot water, foul weather, corrosion, and temperature extremes. Uses are suggested for the 2, 3 and 4-wire Twist-Lock devices in chemical, mining, refining, and marine applications.

Harvey Hubbell, Inc.

**163—Metallic Sheathed Cables**

Bulletin 1031 contains questions and answers on Simplex's new sealed metallic sheathed cables. Simplex C-L-X is a continuous, lightweight, metallic cable sheath which is impervious to gases, chemicals, and water. Its construction, with a thermoplastic covering, gives a combination of unmatched properties.

Simplex Wire & Cable Co.

**164—Molded Case Breakers**

Compact pocket-size bulletin 5004-1A gives construction and performance features, ratings, and details on complete line of I-T-E molded case breakers by types, current ratings, overcurrent devices, accessories, and modifications available. Each model is illustrated in column over specifications.

I-T-E Circuit Breaker Co.



165—Fusible Panelboards

Bulletin 3-230 describes QMQB fusible panelboards from 30 to 1200 amps, 250 to 600 volts. Were developed to meet the increased power of electrical distribution systems. Features are visible blade contacts, dionizing are quenchers, and high pressure fuse holders. Panel-board selection data included.

Federal Pacific Electric Co.



166—Cables

Booklet contains manufacturing data covering cable cores, sheath design, sheathing line inspection, sheath material requirements, and sheath test requirements. Covers all specifications for Stalpath sheathed telephone cables. Strict requirements for electrical characteristics and positive moisture-sealing sheath.

General Cable Corp.



167—Multi-Speed Starters

Describes single and multi-speed starters, including combination and reversing starters, plus Square D Spin Top enclosures for hazardous locations. Also describes motor control racks for field mounting of Spin Top enclosures and other equipment. Bulletin includes price and dimension information.

Square D Co.



168—Power Protector

GEA-6527 describes the LB-1 power protector designed for heavy duty service entrance applications on 240v and 480v systems with available short circuits up to 200,000 rms amperes. A coordinated switch and fuse unit, overload switching ability designed to break up to 12 times rated current.

General Electric Co.



169—Metal-Enclosed Switchgear

Bulletin 2804-1A describes I-T-E's complete line of 4160-volt metal-enclosed switchgear. It covers standard indoor and outdoor and walk-in outdoor types of equipment, and gives construction and performance features and ratings and dimensions for each. A special section provides photos, sketches, and diagrams.

I-T-E Circuit Breaker Co.



170—Motor Control Selector

This new specification aid in "index" form makes it easy to select and order the right magnetic or manual starter for use with most single or polyphase 20 cycle, 1800 rpm, ac squirrel-cage motor applications. Also covers enclosures, push buttons, heaters, and other auxiliary equipment. Ratings, prices included.

Arrow-Hart & Hegeman Electric Co.



171—Control Cable

Bulletin DM-5844 gives full technical data on Anaconda's thermoplastic all-purpose control cable with polyethylene insulation, double Densheath (PVC) jackets. Offers 7-wire stranding, excellent electrical characteristics, easy installation. Resists chemicals, mechanical abuse, moisture, heat deformation.

Anaconda Wire & Cable Co.



172—Dry-Type Transformers

Bulletin 100A contains, in table form, complete statistical information on Hevi-Duty single phase, dry type, insulating transformers, .050 to 500 kva, for power and lighting circuits. Photographs, dimension drawings, capacities, prices, temperature rise, weights, and dimensions are given for each transformer listed.

Hevi-Duty Electric Co.



173—Inverter Power Unit

Catalog sheet A-488 lists features of new Onan transistor inverter power unit designed to supply ac power for electronics equipment during the brief interval it takes for regular standby equipment to take over the emergency electrical load. Performance specifications and features are listed.

D. W. Onan & Sons Inc.



174—Electrical Conduit

Bulletin KE 1058 lists physical, thermal, and electrical data for nonconducting Kraloy PVC (polyvinyl chloride) electrical conduit, with photographic installation details. Specifications for thin wall conduit (1/2 to 2 in.) and standard wall conduit (1/2 to 4 in.), all connections, couplings, and fittings are included.

Kraloy Plastic Pipe Company, Inc.



175—Panelboard Circuit Breaker

Bulletin 3103 covers the Heinemann series 0911, an economical panelboard circuit breaker dimensionally interchangeable with other makes. Available in 1- and 2-pole models, 0.050 to 60 amperes, the 0911 uses hydraulic-magnetic actuation to end heat-induced nuisance tripping. Fast short-circuit interruption.

Heinemann Electric Co.



176—Magnetic Drives

Catalog 243 details the line of magnetic drives from Electric Machinery Mfg. Co. The drive is offered in 5 models from 10 hp to 300 hp. Complete with controls. The drives provide quick, smooth, ac speed changing. Automatic speed control is another feature. Complete selection data and charts are provided.

Electric Machinery Mfg. Co.



177—Power and Lighting Transformers

Bulletin 200 contains complete information about Hevi-Duty three-phase dry-type power and lighting transformers. Sizes range from 6 to 2000 kva. Illustrations, outline drawings, sound levels, capacities, prices, dimensions, weights, wiring diagrams, and temperature rise for each transformer are included.

Hevi-Duty Electric Co.



178—Storage Batteries

Bulletin 210, 24 pages, is a detailed technical manual on the use of stationary storage batteries for switchgear control, and emergency light and power. Includes information necessary for selection of batteries, racks, and chargers; proper maintenance.

Exide Industrial Division,

Electric Storage Battery Co.



179—Electrical Equipment Catalog

New 20-page manual gives comprehensive specification data on Square D electrical equipment—safety switches, panelboards, switchboards, dimmerboards, control centers, bus duct, and substations. The manual also includes convenient reference guide to National Electric Code requirements.
Square D Co.



180—Wiring Devices

Catalog 60, 75 illustrated pages, describes complete range of electrical wiring devices. Both the interchangeable Despard line and the P&S conventional line. Everything from switches to fixtures to devices for every purpose are listed. A 15-page index and price list are also included in this catalog.
Pass & Seymour, Inc.



181—Panelboard Selection Manual

Booklet 1-125 PCR, Stab-lok handbook for easier panel selection, is published by Federal Pacific. Stab-lok features in enclosures and circuit breakers outlined. Enclosure selector covers load centers, split bus enclosures, and 100 amp. main breaker disconnect. Wiring diagrams cover various applications. Knockout data.
Federal Pacific Electric Co.



182—Butyl Insulation

Bulletin EB-27 gives full technical data on Anaconda butyl rubber high-voltage insulation. Discusses AB's superior ozone resistance with test data, also high moisture resistance, dielectric strength, Corona level, aging properties, impulse breakdown, capacity and power factor, cable construction, specifications included.
Anaconda Wire & Cable Co.



183—Rectifier-Type Chargers

New rectifier-type chargers, which provide the most accurate voltage control available in charging of stand-by batteries. They are for use in electric utility service, in emergency power, emergency lighting, and in other float-charge battery applications. Full line described.
Exide Industrial Division,

Electric Storage Battery Co.



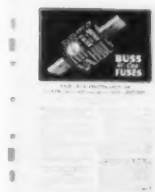
184—Isolated Phase Bus

Bulletin 2604-1A gives ratings and construction details of the company's complete line of isolated phase and nonsegregated phase bus. A 6-page section simplifies planning and ordering of isolated phase bus and explains, with illustrations, how to plan a system both electrically and physically.
I-T-E Circuit Breaker Co.



185—Weathertight Caps, Receptacles

Bulletin H-1035 describes a new line of 3 and 4-wire, 20, 30 and 50 amp. weathertight devices for mobile homes and trailer parks. "Twist-Lock" units include armored caps, bodies, receptacles with lift cover plate, and male motor base with plug. "Seal-Tite" covers for caps and bodies are described. Illustrated.
Harvey Hubbell, Inc.



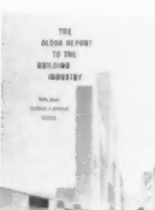
186—High-Capacity Fuses

Bulletin HCS tells how Buss Hi-Cap fuses have unlimited interrupting capacity on any voltage up to 600 to provide safe protection for loads above 600 and up to 5000 amperes. Describes operating characteristics and advantages, illustrates dimensions, contains charts on current limiting effect and opening times.
Bussmann Mfg. Div., McGraw-Edison Co.



187—Secondary Unit Substations

Detailed information on secondary unit substations—complete and compact load distribution centers for indoor or outdoor applications—in bulletin 3104-1A. Gives data and specifications on a large variety of primary devices, transformers, and secondary switchgear offered in I-T-E secondary unit substations.
I-T-E Circuit Breaker Co.



188—Aluminum in Electrical Systems

Subtitled, "facts about aluminum in electrical systems," this publication is based on the report of a comprehensive survey conducted for Alcoa. Conducted by E. E. Ashley, consulting engineers, the survey showed aluminum to be increasingly used in electrical systems on the basis of installed economies.
Aluminum Company of America.



189—Pushbuttons

This complete guide, B-6749A, contains illustrations, application data, dimensions, prices, and circuit wiring information on a complete line of Westinghouse pushbuttons. Included are Oil-tite, standard-duty, and heavy-duty pushbuttons and enclosures, as well as accessories for all units in this 80-page booklet.
Westinghouse Electric Corp.



190—"Reelites"

All new revised catalog 505 consists of 76 pages and describes Appleton Reelites. This is a revision of bulletin 504 listing as many as 25 new Reelites for various purposes. Reelites are designed to automatically take up cable. Catalog lists reels for electric cables; air, gas, liquid, and steel cables.
Appleton Electric Co.



191—Dry-Type Transformers

Bulletin 6907, Specifier's Guide, gives complete information on how to select and apply dry-type transformers. Pictorial index gives outstanding features for each transformer with basic descriptions and photographs, application information and page numbers on which prices, dimensions, other data are found.
General Electric Co.



192—Continental Wire Facilities

"The Four Minute Tour" is a word and picture trip through the facilities and offices of Continental Wire. It points out some of the machines and operations used to make insulated wire and cable; tapping heads, extruder, winder, braiding machinery, carders, varnishing towers, and types of inspection at each point.
Continental Wire Corp.



193—Centralized Circuit Control

This descriptive 52-page bulletin, 32-250, covers centralized circuit control and protection for generators, motors, bus, and feeders up to 13.8 kv. A complete line of functional units available as standardized assemblies in any combination to meet specific requirements. Includes outstanding design features of this unit. *Westinghouse Electric Corp.*



194—Fuseholders

New Buss fuse-fuseholder combination for protection of individual fluorescent fixtures and other equipment on circuits of 300 volts or less. Bulletin SFH-6 tells how individual fusing reduces hazards of fires and explosions. Bulletin specifies the size fuse to use and where to locate it for the best protection. *Bussmann Mfg. Div., McGraw-Edison Co.*



195—Protective Relays

Catalog 5-020 describes Federal Pacific's complete line of protective relays. Featured are 15 models of protective relays, representing 8 different types. Tabular data, special features, design, settings, burdens at 60 cycles, contacts, and case given. Photographs and descriptive material detail its application. *Federal Pacific Electric Co.*



196—Switchboards

This 72-page bulletin gives complete layout and specification information on Square D 14-in. switchboards. Separate sections on circuit breakers and fusible equipment for service and distribution systems. Contains detailed layout and dimension drawings, wire and conduit tables, and lists NEC requirements. *Square D Co.*



197—Aluminum Conduit

Latest available information on aluminum conduit, outlines fact that installed cost is less than steel in most installations of sizes over 1 1/4 inch. Lists, explains advantages: lower installed cost, corrosion resistance, nonmagnetic, light, appearance, nonsparking. Installation instructions, dimension tables included. *Aluminum Company of America.*



198—Hospital Equipment

Bulletin HL-658, a 12-page brochure, describes fully the line of Appleton hospital equipment. This bulletin covers X-ray viewers, explosion-proof and non-explosion-proof plugs and receptacles, switches, clocks, current taps, pilot lights, and grounding accessories. Bulletin is illustrated with photographs. *Appleton Electric Co.*

FIRE PROTECTION



199—Fire Check Book

Fire Check Book is designed as a handy reference for use in the selection and installation of non-sprinkler fire protection equipment. It shows the basic requirements for standpipe system, hose station, extinguisher, and exterior centers. Check Book includes coupon specifications forms which simplify spec-writing. *W. D. Allen Manufacturing Co.*



200—Fire Hydrants

Bulletin 56H describes different types of fire hydrants, all complying with American Water Works Association's latest specifications. Engineering features, material specifications, construction details, various assemblies in exploded views, and installation dimensions are shown. Also included are directions for ordering. *Ludlow Valve Manufacturing Co., Inc.*



201—Fire Extinguishing Systems

Catalog S-62 covers Fyr-Fyter's nine major brands of interior fire extinguishing systems, portable extinguishers, cabinets, and other inside fire control products. Considered one of the most comprehensive product information guide of its type ever published, it is particularly useful to consulting engineers. *Fyr-Fyter Co.*



202—Standpipe Units

First major improvement in thirty years in standpipe fire protection units is completely illustrated and described in this four-page folder. Features hose storage rack on door for increased fire-fighting efficiency. Unit saves wall space. Lower installation costs, lower price. Underwriters' approved. *W. D. Allen Manufacturing Co.*

HEAT EXCHANGERS AND WATER HEATERS



203—Instantaneous Water Heaters

Sims catalog J-1 provides complete engineering data in a condensed form for easy selection of instantaneous water heaters (from 15 to 70,000 gph), booster heaters (from 54 to 6000 gph) and converters (from 2.5 to 1500 gpm). Included in chart form are dimensions, capacities, weights, and prices. *Sims Co., Inc.*



204—Computer Application Report

Brochure S-449 describes Brown Fintube use for creating heat exchanger designs. Reports all computations programmed. Illustrates data load input sheet, diagrams solution with output report. Nontechnical people able to fill in customer data directly from inquiry sheets. Engineers are saved for creative work. *Royal McBee Corp.*



205—Heat Exchangers

Bulletin 132 is illustrated with drawings and photographs. Describes self-contained evaporative method of cooling fluids in a closed system, solving water supply and disposal problems, giving close temperature control. The panel casing construction makes the upkeep simple and inexpensive.

Niagara Blower Co.



206—Heat-Transfer Coils

Bulletin S-55 describes new smooth-fin heat-transfer coil construction that permits closer fin spacing, greater capacity per sq ft of face area, and use of higher air velocities without turbulence or excessive friction. It also illustrates many types of extended-surface heat exchangers for heating, cooling, and processing.

Aerofin Corp.



207—Pressure Vessel Construction

Catalog FAB-11 presents an illustrated guide to pressure vessel construction as provided for under Section VIII of the ASME Code. Furnishes direct reference to the applicable rule in the Code. Typical products and installations shown. A publication by the Fitzgibbons Fabricating Division.

Fitzgibbons Boiler Co., Inc.



208—Heat Exchanger Manual

This catalog contains an engineering section that provides the engineer with the means to make size estimates of heat transfer equipment. It helps the engineer to select a heat exchanger that will provide economy of service, precise operation, and long life. Contains thermal standards and reference data.

Condenser Service & Engrg. Co., Inc.



209—Heat Exchangers

Complete information on heat exchangers for heating radiation water with steam is supplied in this 32-page catalog. Rating tables are supplied for 67 different units with 10, 20, 30 and 40 degree temperatures and steam pressures ranging from 2 to 25 pounds. Catalog SC-159 also includes material specifications.

Bell & Gossett Co.



210—Hot Water Storage Heaters

Catalog 512 describes the full line of RECO hot water heating equipment. This 20-page catalog includes tables, dimensions, diagrams, and other details for both horizontal and vertical storage heaters. Special linings are indicated. RECO storage heaters are time-proved standbys for providing hot water.

Richmond Engineering Co., Inc.



211—Suction Type Oil Heaters

Sims catalog ST describes and includes engineering data, prices, and weights for its standard line of suction type oil heaters. These heat exchanger units apply heat at the storage tank outlet to assure free flow of bunker "C", No. 6 fuel oil, or similar liquids. Various types of Sims equipment are illustrated.

Sims Co., Inc.

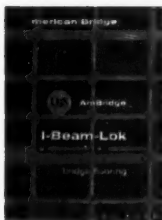


212—Heat Exchangers

Bulletin HT-1 is a condensed description of various heat exchangers, evaporators, oil heaters and coolers, and air coolers of conventional types. Several examples of special types of units are given with data indicating engineering and manufacturing facilities for specially designed types. Diagrams show construction.

Schutte and Koerting Co.

HIGHWAYS, BRIDGES, AND STREETS



213—Bridge Flooring

This booklet contains complete descriptions, specifications, drawings, and design data covering all types of Am-Bridge I-Beam-Lok. Included are details of flooring applications plus a brief discussion showing how Composite Tee-Beam Action can be used with I-Beam-Lok.

American Bridge Division,
U. S. Steel Corp.



214—Asphalt Plant Inspectors Manual

Here for the first time is a manual for the asphalt plant inspector. The 160-page illustrated manual contains a full account of the plant inspector's duties, detailed descriptions of continuous and batch-mix plants. Appended to the text are tables, forms, and a wealth of supplementary information for inspectors.

Asphalt Institute.



215—Suspension Bridge Data

Catalog D-943 contains technical data making possible preliminary calculations for comparative estimates between the suspension bridge and any other contemplated type. Includes formulas for determining cable and suspender lengths, cable tensions, erection calculations, and catenary formulas.

John A. Roebling's Sons Corp.



216—Highway Railings

One of the most complete catalogs on this subject. Contains specifications, design data, details for 47 sizes and types of cast posts, dimensions, and properties of rails and other components. A valuable handbook for the consulting engineer engaged in the design of highway railings. Forty pages.

Michael Flynn Manufacturing Co.



217—Open Metal Decking

Irving decking catalog F-300 contains illustrations, descriptions, and engineering data on open metal grid bridge roadways, with many of the advantages inherent in this type of bridge roadway, such as light weight, cleanliness, drainage, safety, durability, strength, traction, and economy.

Irving Subway Grating Co., Inc.



218—Open Steel Bridge Flooring

Illustrated four-page bulletin on open steel bridge flooring, includes detailed drawings of steel flooring, details of concrete floor plans, and field welding diagram. Also included are load tables and diagnosis of load distribution on four-way grid. Illustrations show ease of handling.

Kerrigan Iron Works, Inc.



219—Traffic and Safety Equipment

This illustrated brochure describes Planet's new line of highway traffic and safety equipment. Included are overhead sign trusses, roadside directional signs, bridge railings, pedestrian overpasses, and the "Planoflash", a portable night construction warning signal that is more visible than those commonly used.

Planet Corp.



220—Reinforcing Wire Products

Catalog of American Steel & Wire products for use in highways and streets. Products included are: welded wire fabric, transverse road joint load transfer assemblies, multisafety cable highway guard, beam guard, high tensile wire and strand for prestressed concrete.

American Steel & Wire Div.,

U. S. Steel Corp.

INSTRUMENTS AND CONTROLS



221—Liquid Level Controls

Bulletin 3004 describes the Petrometer Series 1800 liquid level controls for tanks and process vessels. Available for pressure ranges from .02 to 100 psi and to 30 in. vacuum. Gives applications and construction features. Included are pressure switch selection chart, electrical ratings, and ordering instructions.

Petrometer Corp.



225—Electrical Indicating Instruments

Bulletin 3-610 describes Roller-Smith's lines of electrical indicating instruments, and distribution and control equipment. Included are oil circuit breakers, subway switches, precision balances, rotary switches, panel, switchboard, and portable instruments.

Roller-Smith, Inc., subsidiary of
Federal Pacific Electric Co.



222—Liquid Level Gages

New 8-page, 3-color bulletin 338 covers in detail the complete line of Truscale remote reading liquid level gages. Three styles—Standard, Red Flasher, and Inclined—are available in 4 models to provide for every requirement. Information includes features, operation, and applications.

Jerguson Gage & Valve Co.



226—Pneumatic Recorder-Controllers

Bulletin T-1000 gives design and operating data on the Johnson line of pneumatic recorder-controllers and indicating controllers for automatic regulation of temperature, humidity, and pressure. Typical uses in air conditioning, heating, ventilating, and industrial work are explained in this 20-page booklet.

Johnson Service Co.



223—Automatic Controls

Sixty-page catalog 858 illustrates a full line of mercury switch equipped controls for applications involving pressure, temperature, liquid level, mechanical movement; also hermetically sealed mercury switches and transformer relays. Available in various case styles for indoor, outdoor, or hazardous locations.

Mercoid Corp.



227—Irrigation Meters

Sparling irrigation meters and other irrigation equipment is covered in bulletin 500, a 36-page, profusely illustrated 4-color book. Principles of propeller metering are discussed. Typical types of installations are also shown with cutaway views. Accuracy and head loss curves are provided. For every irrigation application.

Sparling Meter Co.



224—Mobile Testing Laboratories

New sixteen-page catalog, fully illustrated, completely describes all truck and trailer models of mobile laboratories. These make possible job-site engineering testing of foundations for buildings, roads, dams, runways, and for quality control of construction materials as concrete and asphalt.

Soiltest, Inc.



228—Electric Controls

Engineering reference catalog 18A contains a complete line of standard Zenith electric controls and timing devices. Photos, diagrams, engineering data, and prices on automatic transfer switches, magnetic contactors, remote control switches, program clocks, automatic reset timers, cycle timers, and special controls.

Zenith Electric Co.



229—Pressure Controllers

Bulletin D-4150A describes Fisher Wizard II pressure controllers, designed particularly for the process industries. It presents comprehensive information on construction features, operation, calibrated set point adjustment, reversed action, performance, and conversion to other modes of control.

Fisher Governor Co.



230—Liquid Level Indicators

Bulletin A, "Guide to Petrometer Products," describes and illustrates the company's line of liquid level indicators and controls, dial indicators, specific gravity indicators, pneumatic single and duplex manifold valves, fuel and water gages, safety cleanout valves, blowout gun, and other Petrometer products.

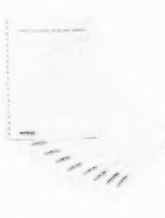
Petrometer Corp.



231—Tank Contents Gaging Systems

Suggested specifications for tank contents gaging systems—hydraulic, hydrostatic, and direct reading—are given in bulletin 463A. Model selection guides and pictorial diagrams are included, along with a list of liquids successfully gaged by Liquidometer systems, and principles of operation of each gage.

Liquidometer Corp.



232—Controls Price Lists

A new complete set of price sheets so designed that engineers, buyers, and purchasing agents will be able to price 90% of the complete line of liquid level and flow controls manufactured by Magnetrol, Inc. Includes specifications about specific gravity, pressure, and temperature ratings of the controls.

Magnetrol, Inc.



233—Dial Thermometers

Catalog 205, 12 pages, describes line of completely new dial direct- and remote-mounted thermometers, with mercury, gas, vapor, or organic liquid actuation, with aluminum or phenolic cases in various designs including variable-angle. Ranges, bulb sizes, connections.

U. S. Gauge Division,

American Machine and Metals, Inc.



234—Liquid Level Gages

How the Eye-Hye gage helps protect the power plant from liquid level accidents is explained in four-page catalog 500, Sec. CO. A diagram shows the flexibility of placement possible: near boiler, tank, or other vessel, or on instrument panelboard, nearby or considerably removed from the boiler.

Reliance Gauge Column Co.



235—Pressure Gages

Catalog G58 introduces a comprehensive line of pressure gages for in-plant processing and general industrial applications. Available in numerous case styles and sizes including a completely safe gage case. Catalog designed for use by specifying engineers, making it easy to select the right gage at all times.

Kunkle Valve Co.



236—Magnetic Gages

Data Unit 306 fully describes and illustrates the new Jerguson magnetic gage which is designed for gaging liquids under conditions where glass, gaskets, and threads cannot be used due to the high potential danger of explosion or fire if the slightest trace of gas escapes. Dimensions and specifications are given.

Jerguson Gage & Valve Co.



237—Solenoid Valves

Solenoid valves for pressures to 5200 psi and for temperatures to 350 F are shown in catalog 51. Valves listed are suitable for controlling air, nitrogen, oxygen, helium, hydrogen, and other liquids and gases. Applications include missile ground support equipment, industrial and marine installations, and others.

Automatic Switch Co.



238—Automatic Controls

Bulletin FS-1 describes a dependable, moderately-priced type of automatic control or safety device that makes or breaks electrical circuit when flow in a pipe starts or stops. Shows wide variety of uses—controlling signal devices, alarms, motors, burners, metering devices—details typical use in air conditioning.

McDonnell & Miller, Inc.



239—Water Gages

Greater visibility and accuracy of reading boiler water pressures to 3000 psi is possible with Yarnall-Waring Color-Port water gages, given full description in 6-page bulletin WG-1814. Explains how gages, available for three pressure ranges, operate, and gives details on construction and ease of servicing.

Yarnall-Waring Co.



240—Process Instruments

Catalog 2 covers indicators, transmitters, recorders, and controllers for flow, pressure, temperature, density, viscosity, and consistency. Standard instruments are stocked at warehouses in Chicago, Atlanta, Houston, Los Angeles, and Toronto, as well as at the main factory at Hathboro, Pa.

Fischer & Porter Co.



241—Radio Telemetering Systems

Bulletin 26, third edition, describes the new line of Stevens radio telemetering systems in the 170 Mc band for measuring, encoding, transmitting, receiving, and graphic recording hydrological and meteorological data. Feature low power consumption, battery operated measuring and transmitting equipment.

Leupold and Stevens Instruments, Inc.



242—TV in Power Plants

Bulletin 2239 tells of TV's use in power plants to improve efficiency and protect costly equipment. Bulletin 2140 tells of industrial applications of TV as a production tool to improve operations; conserve manpower; promote safety. Bulletin entitles recipient to free application engineering assistance.

Diamond Power Specialty Corp.



243—Centralized Pneumatic Controls

Bulletin S-103 describes the functions, applications, and operation of centralized pneumatic controls for air conditioning, heating, and ventilating systems. The advantages of using pneumatic transmission are explained and the latest developments in control center instrumentation are shown in this 12-page booklet. *Johnson Service Co.*



244—Pressure Reducing Valves

Bulletin C-89A describes Fisher pressure reducing valves, relief valves, lever valves, float valves, and strainers for automatic flow control of steam, water, air, gases, and process liquids. Charts covering size, specifications, dimensions, pressure ranges and ratings, and capacities are included. *Fisher Governor Co.*



245—Automatic Starting Controls

Bulletin 1025-134 provides complete information (including pricing) on controls intended for fully automatic starting and stopping of engine-driven generator sets. Associated control equipment for complete energizing control systems is described. Includes application and construction information. *Automatic Switch Co.*



246—Specification Guide

Form 632 is a specification guide especially designed in handy folder form to assist consulting engineers to specify their choice of tank contents gaging systems for each project. Contains sample specifications for hydraulic system, and hydrostatic systems (manually operated and continuous reading). *Liquidometer Corp.*



247—Industrial Pressure Gages

Catalog 505 introduces the entirely new USC "A"-Line of general purpose industrial gages, which conform to or exceed ASA Grade A standards. Various designs and sizes, for use in air, oil, steam, refrigerants, hydraulic or ammonia systems, compressors. *U. S. Gauge Division,*

American Machine and Metals, Inc.



248—Safety Controls

Engineering data on operating and safety controls for a wide variety of jobs involving liquid level or liquid flow. Discusses 21 case studies of special applications of McDonnell float-operated switches and valves, and flow switches. Designed to suggest a dependable, economical answer to control problems. *McDonnell & Miller, Inc.*



249—Displacement Gas Meters

Listing 39 sizes of rotary type positive displacement gas meters for measuring flows ranging from 1000 to 1,000,000 cfh at pressures up to 125 psi, new bulletin M-258 provides complete descriptive data and installation views. Certified proof tests on Bureau of Standards' approved equipment can be furnished. *Roots-Commerston Blower Division.*



250—The "Levermatic"

A new and compact soils load settlement device called the Levermatic consolidation apparatus is an entirely self-contained unit easily carried by one man. The unit is designed to predict, through laboratory tests, the settlement of a foundation under a dam, building, bridge, or similar structure. *Soiltest, Inc.*



251—Telemetering Equipment

Bulletin 100-R5 describes complete line of flow tubes; telemetering equipment; supervisory control systems; butterfly valves; valve positioners; steam, air, gas meters; belt conveyor scales; chlorine gas feeders. Illustrated catalog describes uses, design features, performance characteristics, models and sizes. *B-I-F Industries, Inc.*



252—Steam Gages

Bulletin 18 describes staff gages, gaging reels, sounding reels, and other stream gaging accessories as well as the new Stevens surface detector. The surface detector is a servo float control, dry cell battery operated, that operates a graphic recorder to register water levels to 0.01 foot operation in a 3-in. i.d. guide pipe. *Leupold and Stevens Instruments, Inc.*



253—"Oiltight" Control Units

This publication describes standard duty, heavy duty and "oiltight" control units and stations applicable for every industry. Complete information on applications, ratings, and design features are included. All types of control units, stations, enclosures, and "oiltight" controls are shown and described. *Allen-Bradley Co.*



254—Liquid Level Alarms

A series of four Levalarms, liquid level alarms, and fuel cut-outs, is described in four-page bulletin D2. The bulletin explains principle of operation — water conduction between electrodes of varying lengths — and how units can be used with relays to provide alarm actuation, fuel cut-out, or pump start-stop control. *Reliance Gauge Column Co.*



255—Automatic Control Systems

New 8-page planning guide for engineers and architects covers the 3 important phases of designing a building's automatic control system. Describes the various types of control systems, basic components for each, selection factors to consider in design, and data on centralized remote control applications. *Barber-Colman Co.*



256—Magnetic Flowmeters

Catalog 10D1416 discusses principle and operation of magnetic flowmeters. Gives advantages and specifications of Fischer & Porter obstructionless flowmeter for measuring flow rate of difficult liquids such as concentrated acids and alkalis, slurries, sewage, pigment dyes, and many others. *Fischer & Porter Co.*



257—Water and Sewage Meters

Bulletin 314-1, 20 pages, describes in detail the design and operation of Sparling's complete line of Main-line propeller meters for water and sewage works. Describes the principle and advantages of propeller metering. Various types shown, sizes 2 to 72 in., with graphs showing high accuracy and low head loss curves. Sparling Meter Co.



258—Gas Flowmeter

Catalog 178 describes mass flow primary elements of stainless steel construction for use in metering or controlling the mass rate of flow of gases. Complete metering-controlling systems are available for pressures up to 600 psig and flow rates up to 300 Scfm or 1500 lbs./hr. Features and ordering information. National Instrument Laboratories, Inc.

— INSULATION —



259—Duct Insulation

Bulletin IN-177A describes Johns-Manville "Spintex" duct insulation. This 6-page bulletin contains photographs showing ease of cutting, nonburning qualities, and method of installation. Diagrams show installation of flexible and semi-rigid Spintex. Specifications include weight, width, length, and thickness. Johns-Manville Corp.



260—"Snap-On" Pipe Insulation

"Snap-On Pipe Insulation," eight-page booklet, describes characteristics and application data for one piece, fine-glass pipe insulation. Application specifications cover: plumbing, heating, insulation of valves and fittings, cold piping, and dual temperature outdoor piping. Thickness charts are also included. Gustin-Bacon Manufacturing Co.



261—Plastic Pipe Insulation

Bulletin IN-213A describes Johns-Manville's Aerotube foamed plastic pipe insulation. This insulation stops sweating, is clean, sanitary, and extremely flexible. It comes in six-foot lengths and can be installed at substantial labor savings. Photographs show installation procedures on new jobs, and existing piping. Johns-Manville Corp.



262—"Foamglas" Insulation

Booklet FL-104 describes the use of Foamglas insulation in low temperature spaces. This product is vapor-proof, vermin-proof, dimensionally stable, incombustible, and waterproof. Booklet contains photographs and brief descriptions of unusual types of cold storage enclosures made possible by this new product. Pittsburgh Corning Corp.



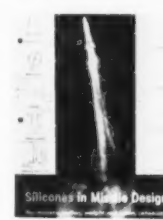
263—Underground Pipe Insulation

Four-page illustrated brochure discusses the problems of underground pipe insulation and explains how Gilsonite's special properties overcome them. On-the-job photographs illustrate ease and speed of application. Thermal coefficients of transmission and other technical data and specifications are given. American Gilsonite Co.



264—Fused Silica Insulation

Bulletin FS-1 describes Foamsil, a new insulating and refractory material. Contains background information on this new material, which is 99% pure fused silica and has a practical operating range of -450 F to 2200 F. Material is unaffected by practically all commonly used acids. Physical characteristics outlined. Pittsburgh Corning Corp.



265—Missile Designer's Reference

Use of silicones to aid miniaturization and weight reduction, and to increase reliability of missiles and missile components is aptly described and illustrated in bulletin 1-131. Specific uses for silicone rubbers, resins, dielectrics, fluids, greases and compounds are described in detail. Dow Corning Corp.



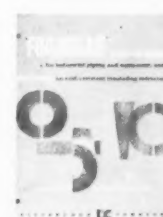
266—Sprayed Asbestos Insulation

Bulletin SL-8 describes fire-protection, acoustical control, anti-sweat, and heat-saving properties of sprayed "Limpet" asbestos, a simple sprayed-on blanket of 100% asbestos which adheres to all interior surfaces without hiding decorative details. Up to four hours' fire-protection provided to beams and floors. Kearsbey & Mattison Co.



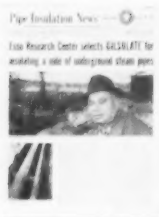
267—"Ultralite" Duct Insulation

Catalog ULD describes the use of Ultralite, the long textile type insulation for duct wrap and duct liner. Characteristics of Ultralite duct liner, together with application methods, are illustrated. Facings available, shipping information, and location of local stocks are given. This 8-page catalog includes specifications. Gustin-Bacon Manufacturing Co.



268—Cellular Glass Insulation

Bulletin FI-106 describes Pittsburgh Corning's cellular glass insulation for industrial piping and equipment, and Foamsil an acid-resistant insulating refractory. Foamglas is fireproof, prevents corrosion, and acts as its own vapor barrier. Installations pictured. Directions on how to apply and specifications included. Pittsburgh Corning Corp.



269—Underground Pipe Insulation

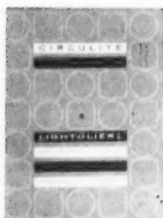
News magazine, published by the manufacturer of Gilsulate insulation for underground hot pipes, carries stories and articles on actual installations. This issue describes use of Gilsulate in installations at Esso Research Center and Tennessee Eastman, announces booklet available, "Gilsulate At Your Service." American Gilsonite Co.



Building Insulation

Bulletin FB-105 describes Pittsburgh Corning's Foamglas building insulation. Used for roofs, ceilings, walls, and perimeters. It is light-weight, waterproof, and long lasting. Physical properties are given as well as general specifications. Application procedures are described and illustrated. Accessories listed. Pittsburgh Corning Corp.

LIGHTING



271—Surface Fluorescent Lighting

This Circulite bulletin 23 describes a new, fully-enclosed light form that utilizes two Circline lamps, one 12" dia. 32W and one 16" dia. 40W. Cross-sectional drawings detail the regressed housing and the frameless, self-supporting diffuser. Full product information is given for both sizes, 18" and 24" units. Lightolier, Inc.



272—Industrial Fluorescent Fixtures

Bulletin OD1022 describes Operation Up-light fluorescent industrial lighting fixtures. Case history photos and complete cost comparisons prove fixtures with 25% or more upward lighting have lower first cost and lower maintenance cost. Details and features of CFI-25 and CFI-30 fixtures are fully illustrated. Day-Brite Lighting, Inc.



273—Fluorescent Lamp Ballasts

New brochure describes the Advance fluorescent lamp ballast service warranty program which provides protection against abnormal labor costs should an excessive number of ballast failures occur. Includes explanation, service warranty policy, service manual and ballast check list. Advance Transformer Co.



274—Fluorescent Fixtures

Catalog contains complete data on heavy-duty Series 88-PC, especially designed for high output lamps. Describes porcelain enamel finish, 15" transverse shielding, 20% upward light, metal-clad sockets, other features. Illustrated with huge Convair high-bay installation, also photometric and technical details. All-Brite Fluorescent Fixtures, Inc.



275—Fluorescent Lamp Ballasts

This bi-monthly newsletter covers advances in ballasts for fluorescent lighting and the activities of the Certified Ballast Manufacturers Association. It reports the latest news of industry's progress in improving fluorescent lighting performance standards. Sent free to Consulting Engineers on request. Certified Ballast Manufacturers Ass'n.



276—Fluorescent Fixtures

AD-6856 introduces a companion fixture to the popular Catalina series. General construction identical to Catalina except C-2 features a patented, low-brightness, polystyrene lens in place of the Catalina louver. Designed to blend into the latest architectural decor with its flowing lines of light. Benjamin Electric Mfg. Co.



277—Industrial Lighting

Industrial Lighting Newsletter — the first issue of the second volume of the continuing RLM service to specifiers of industrial lighting equipment — includes items on ballasts for high-output 800-ma. lamps, code numbers for mercury lamps, vaportight fixtures, porcelain enamel. Subscriptions are free to consultants. RLM Standards Institute, Inc.



278—Weathertight Fluorescent Fixtures

Folio 59-3 introduces new 98 Line by McPhilben as the ultimate in weathertight fluorescent luminaires for industrial or commercial applications. 98 Line in extruded aluminum with Holophane Controlens available in 4 ft, 6 ft and 8 ft units using high output or slimline lamps. Furnishes complete specifications. McPhilben Lighting Inc.



279—Floodlights

Catalog 320 is the first completely new floodlight book by Crouse-Hinds since 1952 has colorful "new look", including colored divider sheets with individual Contents tables, revamped page styling. Several new sections in the 184-page catalog include "How to Select Floodlights" and "Mercury Vapor Floodlights". Crouse-Hinds Co.



280—Fluorescent Fixtures

Bulletin V-700 describes Sylvania's new line of shallow recessed troffers, designed for installation in all modern ceiling systems. Features are low cost installation, wide range of models, concealed hinges and latches. Designed in three types of housings to fit all nationally known ceiling systems. Sylvania Electric Products.



281—Lighting Bulletin

Neo-Ray's lighting bulletin describes many different types of surface/recessed lighting fixtures, fluorescent and incandescent, in all modular sizes. Shielding mediums range from small cell louvers to Holophane Controlens, glass or acrylic. Recessed units furnished with jack-clamps for mounting in ceiling systems.

Neo-Ray Products, Inc.



282—Residential Built-In Fixtures

Four-color, 8-page file folder, shows multiplicity of residential uses for built-in fixtures with wide spread of light; gives wattage requirements and lighting layout for typical home. Question and answer section contains information on subject of proper room lighting. Gives ceiling opening sizes and frame dimensions.

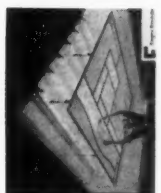
Kirlin Co.



283—Commercial Fluorescent Fixtures

Two catalog pages on Miller Decor-A-Lite fluorescent fixture for commercial lighting. Of special interest are decorative lancings along the side panels, which may be illuminated by white or colored light. Comes in 2-lamp, 48 inch; 4-lamp, 24 inch, and 4-lamp 48 inch. Four types of bottom enclosures.

Miller Co.



284—Area Ceiling Lighting

Bulletin L/A 1 deals with use of Lumen-area ceiling lighting as a source of light. Specifications show ways to gain unlimited effects using standard parts and colored Polycube® overlap-reverse-interlok plastic louver. No crossbars required so run can be 2 feet or 2000 feet, as desired.

Electro Lighting Corp.



285—Lighting Fixtures

The new, 12-page Guth condensed catalog provides a compact presentation of the complete line of Guth fluorescent and Brascolite incandescent luminaires for commercial, industrial, and institutional lighting applications. Data on surface and pendant mounted units, recessed luminaires, and Gratelite electric ceilings.

Edwin F. Guth Co.



286—Specifications Book

New specifications are included in the 1958 RLM Standard Specification Book, a reference guide for those concerned with industrial lighting units, covering: 2-lamp and 3-lamp special service fluorescent units; 3 types of units using 800 ma. fluorescent lamps; new incandescent reflector sizes; new specifications.

RLM Standards Institute, Inc.



287—Enclosed Modular Fixtures

Area/Liter brochure describes full line of enclosed modular fixtures with vinyl diffusers. Basic units may be combined into rows, patterns, or luminous areas, providing wide distribution, comfort, beauty, freedom from glare, easy installation. Includes full photometric and technical data, specifications, details.

All-Brite Fluorescent Fixtures, Inc.



288—Fluorescent Fixtures

Complete line of fluorescent fixtures for all styles of lamps. Features porcelain enamel reflectors in apertured or solid top; open or closed end reflectors. Both standard and protected types meet latest RLM and electrical specifications. Standard units available for individual or continuous line installation.

Benjamin Electric Mfg. Co.



289—Lighting Design Data Sheet

Folder VE-900 is an 8-page folder which opens into two 4-page spreads for wall mounting, on desks under glass or other reference use. One side provides basic instructions and formulae on lighting calculations plus new IES footcandle levels; other side provides utilization data on 81 fixture types.

Sylvania Electric Products.



290—Industrial Lighting Fixtures

New 8-page, 4-color brochure describing Guth Kolorkoded industrial lighting fixtures opens a new field in industrial lighting. Folder includes photographs, lighting data, engineering information, and complete descriptive data on Kolorkoded luminaires and standard RLM reflector units.

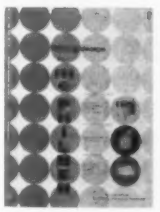
Edwin F. Guth Co.



291—Fluorescent Lamp Ballasts

"How Fluorescent Lamp Ballasts That Bear the CBM Emblem Insure Your Lighting Investment" is a 16-page illustrated booklet. The booklet explains how the Certified Ballast Manufacturers Association's ballast specifications covering lighting performance benefit all persons concerned with fluorescent lighting.

Certified Ballast Manufacturers Ass'n.



292—Aluminum Lighting Units

Folio 59-1, a 12-page booklet, describes the McPhilben line of cast aluminum lighting units for special purpose applications. Divided into 3 sections: vaportight, weathertight lighting; exit and directional; and general lighting. Revised specifications, dimensional drawings, applications, and optional features.

McPhilben Lighting Inc.



293—Recessed Lighting

An important new 16-page catalog of the latest precision-engineered fluorescent lighting for stores, offices, public areas. Fully details a new controlled brightness lens (Acrylens), a new extruded aluminum flange for arrow-straight continuous runs, and a wide range of Optplex and Sightron diffusers.

Lightolier, Inc.



294—Exit Lighting Fixtures

Bulletin 272F, details all-aluminum, surface mounting exit lighting fixtures new in design and construction. Shows complete line of 6 in. letter exits. Features interchangeable wiring for incandescent or fluorescent lighting; glow-in-dark glass; shock resisting glass; stenciled metal fronts and luminous bottoms.

Kirlin Co.



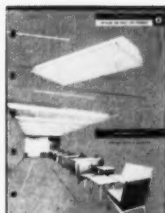
295—Louvered Ceiling

Bulletin N-58 describes the SC-Min-Cell louvered ceiling. Available in two sizes, 2 x 4 and 3 x 3 ft. modules. Louvers are fabricated of aluminum, finished in baked white enamel or new Ripple-Tex aluminized finish. Included are suggested layouts, construction details, and illustrations of typical installations. *Neo-Ray Products, Inc.*



296—Lighting Equipment

Electro Lighting Corp. offers its Electro-Log, a compact presentation of one of the industry's most complete lines of lighting equipment — commercial and industrial fluorescents, industrial incandescent, and mercury. The Electro-Log, 8 pages, is designed for and available to all those who specify lighting. *Electro Lighting Co.*



297—Aluminum Troffers

Miller Versaline and single lamp aluminum troffers are illustrated and described in a 36-page catalog, section 2. Designed for recessed mounting individually, in continuous rows and in patterns in a wide range of ceiling types. Choice of 10 different enclosures. Complete specifications. *Miller Co.*



298—Lighting and Air Conditioning

Bulletin OD692 covers new Paraflo troffer fluorescent lighting and air conditioning diffuser in one attractive unit. Paraflo provides high comfort lighting and comfortable diffusion of both warm air in winter and cool air in summer. Available in 1 x 4 and 1 x 8 ft diffuser. Various suspension systems. *Day-Brite Lighting, Inc.*

MATERIALS HANDLING AND STORAGE



299—Improve Efficiency

Contained in 20-page booklet (25B9084) are descriptions of 59 ways in which your clients can improve operating efficiency, increase production, lower cost of new equipment, reduce maintenance, or improve working and safety conditions. Covers over 35 electrical, mechanical, and materials handling products. *Allis-Chalmers Manufacturing Co.*



300—Cone-Roof Tanks

Graver's booklet on the many uses of standard cone-roof tanks has proved so popular that a third printing is now being completed. This 20-page booklet presents the many applications of standard steel storage tanks for petroleum, chemicals, water, and dry products. Sizes, capacities, and specifications given. *Graver Tank & Mfg. Co., Inc.*



301—Concrete Storage Bins

Bulletin describes Super-Concrete storage bins for industry. Explains how bins are engineered specifically to purchaser's requirements. Describes the installation of concrete roofs and elevated floors, when desired. Lists materials stored and gives prominent users. Contains tables of capacities and photographs. *Neff & Fry Co.*



302—Feeding Systems

Bulletin 32-R2 describes Omega line of continuous loss-in-weight feeding systems engineered to handle and feed flowable solids and liquids at precisely controlled rates. Bulletin illustrates simplex and duplex feeding systems, describes weighing, controlling and feeding operations; dimensions; capacities. *B I-F Industries, Inc.*



303—Cranes and Other Equipment

Bulletin 242 describes in word and picture Whiting equipment at work in various metal-working industries. Includes hydro-arc electric furnaces, stamping trimmers, foundry equipment, cranes, rotary shears, and Trambeam overhead handling. Plants of all sizes using standard and special adaptations shown. *Whiting Corp.*



304—Linings and Tile Tanks

Scope of complete service — design, installation, and maintenance — of corrosion-resistant linings and tile tanks described in 4-page bulletin which also describes the types of membrane linings and tile types and shapes used in lining and erecting silos, slurry tanks, chests. Bulletin A-158. *Stebbins Engineering & Mfg. Co.*



305—Automated Handling Systems

Catalog 67-A describes, illustrates (photographs and diagrams) engineered and automated handling systems. The 16-page "Plan with Planet" brochure also illustrates equipment for bulk and unit materials, automated and special handling machinery, and foundry equipment, and describes Planet's creative service. *Planet Corp.*



306—Wood Tanks

Eight-page bulletin 655-W explains why wood tanks can meet conditions other types of tanks cannot. It describes round, rectangular, and special tanks, vats, boxes, sinks, and flumes and lists possible uses for each along with the type of hardware and lining available, and gives installation photographs. *Kalamazoo Tank & Silo Co.*



307—Belt Conveyors

Bulletin LD-105 gives specifications and selection data on pre-fabricated belt conveyors of tubular truss design. Tables for horsepower determination, drive and belt selection, plus data on idlers, intermediate support sections, tails, and take-ups. Explains advantages of tubular over angle design.

Joy Manufacturing Co.



308—Industrial Storage Systems

"Modern Industrial Storage Systems," 12-page brochure 4393, discusses the subject of storage for raw ingredients, semi-processed, or finished materials. The flexibility and adaptability of concrete silos is discussed. Descriptions of component parts and construction are supplemented with line drawings.

Marietta Concrete Corp.



309—Conveyor Systems

Bulletin G-3B describes Fuller rotary compressors and vacuum pumps; horizontal-grate material coolers; Fuller pre-heater, Humboldt suspension type; Fuller-Kinyon Airveyor, and F-H Airslide conveying systems for handling dry, pulverized, granular, and crushed materials. Fully illustrated.

Fuller Co.



310—Belt Conveyor Systems

Bulletin 1000-X describes the belt conveyor systems manufactured by Hewitt-Robins. Products for conveying, crushing, stacking, blending, mixing, and reclaiming. Equipment manufactured include conveyor belting, industrial hose, conveyor machinery, and power transmission equipment. Installations shown.

Hewitt-Robins Inc.



311—Car Pullers

Ten-page bulletin L-6 shows capstan type car puller for moving cars a short distance using manila rope. Three styles of drum car pullers for heavy duty car moving, shuttle work, or for servicing very large areas are also listed, as well as barge movers for shifting barges back and forth during unloading.

Clyde Iron Works, Inc.



312—Materials Handling, Processing

Fully illustrated brochure 182, 36 pages, presents a report of R&S diversified services for coal and iron ore mining, steel mills, and railroads. It features materials handling and processing facilities; also ore beneficiation plants aside from specialized coal preparation plants and fabrication in well equipped shops.

Roberts & Schaefer Co.



313—"Volumetric" Feeder

Bulletin TP-11-M is a 6-page publication which describes the equipment, operation, and major features of the Wallace & Tierman Volumetric feeder. This feeder is specifically designed to allow custom installations from standard components. Included is a chart showing typical types of installations.

Wallace & Tierman Inc.



314—"Stokerkol" Sizers

Bulletin 938 describes Stokerkol sizers, Series "R" and "N", for sizing ROM lump, egg, and nut coal to a minus 1, 1 1/4 or 1 1/2 in. product in a single operation. Contains ample illustrations, drawings, and descriptive exposition. Specially shaped teeth which permit a clean piercing action are a special feature.

Jeffrey Manufacturing Co.



315—Car Shaker

Bulletin 07B7221B describes the many operating advantages and lists specifications of car shaker for unloading granular materials from open, hopper-bottom gondola cars. Push-button operated, the car shaker can unload cars in less than two minutes, even if material is damp, compacted, or partially frozen.

Allis-Chalmers Manufacturing Co.



316—Vibrating Feeder

Bulletin 169 describes the Eliptex extra heavy duty vibrating feeder. This feeder is built to withstand severe battering in tough service involving unusually large and heavy materials. The advantages of this feeder are listed and the principle of operation explained. Standard specifications given and installations illustrated.

Hewitt-Robins Inc.



317—Tanks and Chests

Kalamazoo vitrified glazed tile tanks and chests are described in four-page bulletin 1-55-T. Drawings and photos show how the two types of tile blocks available provide flexibility of wall design. Types, sizes, design, erection, and cost are discussed, and typical installation in industry are pictured also.

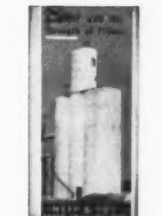
Kalamazoo Tank & Silo Co.



318—Reprints for Framing

Reprints of Graver's notable ads in full color continue to be available. The newest ad in this attractive series describes a 200,000-gallon elevated tank for the city of Ashland, Ohio. A striking example of a typical water storage facility, this dramatic view is very well-suited for office decoration.

Graver Tank & Mfg. Co., Inc.



319—Concrete Storage Bins

Construction of Super-Concrete stave storage bins for industry is explained in the folder, "Bins with the Strength of Pillars." Contains tables of capacities and photographs of typical installations. Lists of prominent users, varieties of materials stored, and other uses for the bins are given in this valuable bulletin.

Neff & Fry Co.



320—"Trambeam" Monorail Equipment

Bulletin 244 takes you to plants, yards, and shops of varying sizes showing Whiting equipment at work in different and unusual installations, many custom built. Case study write-ups deal with crane, Trambeam monorail, transportation, foundry, and chemical processing equipment. Booklet is fully illustrated.

Whiting Corp.



321—Automatic Bulk Handling

Bulletin 531, "New Techniques for Automatic Bulk Handling," is a 12-page report covering latest methods of pneumatic conveying. It details techniques for centralized automatic control, flow control, and bulk materials distribution throughout production. Installations are pictured.

Dracoco Division of Fuller Co.



322—Tank Design Reference Book

This handy reference booklet contains tables of circles and spheres, area and volume formulas, decimals of an inch and foot, tile shapes, standard reinforcing bars, wood pulp fiber in solution, capacities of tanks, conversion factors, and other information for use in designing tanks. Bulletin TC-155.

Stebbins Engineering and Mfg. Co.



323—Power Hoists

Bulletin 34A, 20 pages, describes the Clyde line of electric, gasoline, and diesel hoists. Gives construction details of medium capacity hoists of various line pulls. Also includes information as to selecting the hoist, information required for hoist quotation, and table of drum cable capacities. Available accessories are listed.

Clyde Iron Works, Inc.



324—"Flo-Tube"

Bulletin 957 explains how Flo-tube moves materials mechanically with simplified manual or automatic controls. Flo-tube moves chemicals, coal, gravel, salt, sand, sugar, wood chips, and similar materials from bins and piles to receiving hoppers or processing machines at predetermined rates, at any angle.

Canton Stoker Corp.



325—Bucket Elevators

Catalog 950 contains all necessary descriptive, dimensional, and engineering data for ease in elevator selection. Equipment for handling bulk material from fines up to 8 in. lumps in capacities ranging up to 525 T P H is detailed. Includes section on centrifugal type elevators for cement mill and heavy duty service.

Jeffrey Manufacturing Co.



326—Materials Handling Equipment

Bulletin 5000A covers Conco custom-engineered overhead electric traveling cranes, of double girder construction. Can be furnished in a wide range of capacities and spans. Also included are hand-powered overhead traveling cranes, hand-powered and electric hoists.

Conco Engineering Works,

Division of H. D. Conkey & Co.

MECHANICAL POWER TRANSMISSION



327—Right-Angle Gear Drives

Right-angle solid shaft gear drives, for centrifugal pumps and industrial use—cooling tower installations, barge service, sewage disposal, fire and flood control—manufactured in a wide range of models to meet specific requirements, are described and illustrated with engineering details in eight-page catalog 29.

Johnson Gear & Manufacturing Co., Ltd.



328—Flexible Gear Couplings

Advantages and typical applications of flexible gear couplings are pictured and described in 16-page catalog C-5, "The Revolutionary New Sier-Bath Flexible Gear Couplings." Couplings are available in standard, vertical, millmotor, floating shaft, and spacer type, and in many special purpose types.

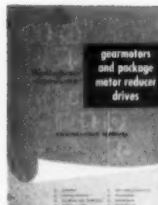
Sier-Bath Gear & Pump Co., Inc.



329—Reducing Gears

Bulletin J-14 gives complete engineering data on nine standard sizes of worm-helical units with ratios from 25.63 to 1 up to 357.5 to 1 and horsepower ratings from .85 to 175. Typical cross sections are diagramed. Included are application data, load characteristics, service factors, selection procedure, and specifications.

Hewitt-Robbins Inc.



330—Package Motor Reducer Drive

Fully illustrated booklet 7223, 33 pages, includes recommendations, ratings, dimensions, and other application data, to assist the consulting engineer in selecting the proper gearmotor or package motor reducer drive for his particular application. This manual describes Moduline gear units for maximum adaptability.

Westinghouse Electric Corp.



331—Gears

A 20-page catalog describes in general the kinds and sizes of gears manufactured by this company. Its contents deal with spur gears, bevel gears, helical gears, worm gears, racks, nonmetallic gears, sheaves, sprockets, special machinery of which gears form a part. Illustrated with photographs.

Earle Gear and Machinery Co.



332—High-Speed Gears

Eight-page bulletin S130 describes Terry high-speed gearing for speed-increasing or speed-reducing service. Designs for gears, gear cases, bearings, and the lubrication system are fully illustrated and explained in the text. Approximate over-all dimensions are given for the smaller units.

Terry Steam Turbine Co.



333—Variable-Pitch Sheaves

Integral-shaft variable-pitch sheaves for stepless speed control of large machine drives are discussed in bulletin 20B7897B. Advantages listed for this type of drive include wide speed range, accurate speed control within 0.1%, while drive is in motion, and the inherent low-cost of a V-belt drive.

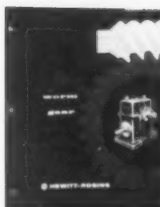
Allis-Chalmers Manufacturing Co.



334—Turbine Pump Drives

Right angle turbine pump drives, in standard and combination drive installations and available in a wide range of models to meet specific requirements of high or slow speed prime movers and pumps, are described and illustrated in nine-page catalog 30. Tables show power ratings and average efficiencies.

Johnson Gear & Manufacturing Co., Ltd.



335—Worm Reduction Gears

Bulletin J-13 gives detailed description of six types of worm gear reducers. General specifications, styles available, application data, and service factors. Step-by-step selection procedure with various examples. Included are ratings for types and standard dimensions. This 40-page booklet is well illustrated.

Hewitt-Robins Inc.



336—Speed Reducers

A sixteen-page illustrated catalog, describing speed reducers as applied to operating machinery, particularly bridge machinery, is available. Outlined are specifications, service factors, horsepower ratings, and dimensions of the particular units illustrated. Gasoline power units are also dealt with.

Earle Gear and Machinery Co.

OFFICE EQUIPMENT AND SERVICES



337—"Copytron" Enlarger-Printer

Bulletin A-2403A describes Copytron enlarger-printer which makes sharp, permanent enlargements for only a few pennies. Machine enlarges 35mm microfilm 14-16 times. New electrostatic printing process, uses no intermediates, drums, or plates, and requires no skilled operator. Diagrams show basic principle.

Charles Bruning Co., Inc.



339—Insurance Protection

Provision of insurance protection against claims resulting from negligent acts, errors or omissions committed by an individual, or his staff, in the professional conduct of that business as Architects, Engineers, Consulting Engineers, or Surveyors. Main and branch office addresses are given.

Luddington Corp.



338—Computer

Brochure S-525R1 outlines basic features, illustrates with major components. Specifications listed, with command table. Also small size, large memory of 4096 words. Electric typewriter with punched tape standard input-output. New optional reader, speed 200 characters. Combination reader and punch, speed 20.

Royal McBee Corp.



340—"Copyflex" Diazo Process

Bulletin A-2360 is an illustrated 12-page booklet describing Bruning Copyflex diazo process for reproducing engineering drawings for as little as a penny each. Booklet lists some of the machines and materials available and tells how Copyflex is used to cut drafting time and to reduce costs.

Charles Bruning Co., Inc.

PIPING, VALVES, AND PLUMBING



341—Magnetic and Motorized Valves

Within its 24 pages, catalog V-58 illustrates and lists specifications of magnetic and motorized valves for use with air, water, gas, steam, oil, and refrigerants. Also included are solenoid coil rating tables—one for liquids, the other for compressible fluids. Dimensional drawings are included.

Mercoid Corp.



343—Valves, Fire Hydrants, Accessories

Catalog 57 covers the Darling line of valves, fire hydrants, and accessories. This catalog, containing 244 pages, sewed with hard cover, is a permanent addition to the consulting engineer's library. Shows pictorially how Darling products are made and various different applications of the products. Specifications given.

Darling Valve & Manufacturing Co.



342—Liquid Filters

Bulletin 7C, 16 pages, illustrates and describes the full line of crenulated laminated disc liquid filters for removing small micron-size foreign solids from most liquids one pass through at a rate of 1 gpm at 1 psi pressure drop to 1260 gpm at 3 psi pressure drop, of 35 ssu viscosity fluid.

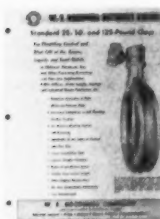
William W. Nugent & Co., Inc.



344—Remote Water Coolers

Bulletin T-417 describes remote water-cooler application in plants, restaurants, schools, and like buildings. Single condensing unit serves multiple bubbler outlets or glass-filling stations; installs behind building walls, on overhead wall brackets; 6 to 24 gph. Complete specifications, dimensions, and capacities.

Temprite Products Corp.



345—Butterfly Valves

Bulletin 582 describes Rockwell butterfly valves, standard 25, 50, and 125 lb class, for throttling, control, and shut-off of air, gases, liquids, and semi-solids in processing, utility, and industrial applications. Features of this valve are described and pictured. Accessories are listed as well as dimensions and specifications.

W. S. Rockwell Co.



346—Bronze Valves

New circular shows 150, 200, 300-pound bronze valves that offer such advantages as: full flow with least pressure-drop and turbulence, 500 Brinell stainless steel seats and discs, long life, little maintenance. Can be furnished with indicator arm, collar, and V-port disc for accurate visual control.

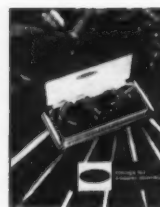
Wm. Powell Co.



347—Valve Catalog

This new valve catalog digest furnishes the latest coverage of the OIC bronze, iron, cast steel, forged steel, and lubricated plug valve lines in a condensed form. Classified by type and pressure class, and illustrated, this edition also includes face to face dimensions for each size and type of valve listed.

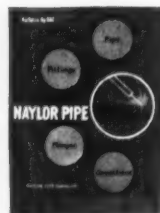
Ohio Injector Co.



348—Pipe Fittings

Catalog I presents the complete line of NIBCO wrot, cast solder, cast drainage, flanged, and flared tube fittings. It is a manual of technical information to help the consultant select fittings for copper tube installations. Included are rough-in measurements, advantages for using NIBCO fittings, engineering data.

NIBCO Inc.



349—Lightweight Pipe Fittings

New 8-page condensed catalog summarizes complete line of Naylor lightweight pipe, fittings, flanges, and connections. Lists typical applications. Includes standard specifications on pipe from 4 to 30 inches diameter, together with details on standard fittings and flanges. Covers couplings for pipelines.

Naylor Pipe Co.



350—Hard Rubber Pipe, Fittings

New, complete, twelve-page, two-color bulletin PF-1300 describes hard rubber pipe, fittings, and valves; dimensions, chemical, and physical properties of heat-resistant Buna-N compound and natural rubber as well as general information. Cross-section dimensional drawings of all types of valves are shown.

Luzerne Rubber Co.



351—Prefabricated Piping Systems

The new edition of the Ric-wil product catalog covers construction features for prefabricated, insulated piping systems for steam, hot water, oil, or refrigeration distribution lines. Types of systems covered include Hel-cor, Uniline, type J, and cast iron. Prefabricated accessories are also included.

Ric-wil, Inc.



352—Water Fountains

Revised folder shows Haws models in lightweight fiberglass; multiple fountain 10Y and wall Model 71, each available in a choice of colors at no extra cost. Explains how fiberglass produces lightweight, strong, exceptionally attractive fountains. Complete with detail drawings and color samples.

Haws Drinking Faucet Co.



353—Malleable Iron Unions

Dart malleable iron unions, with two bronze seats ground to a true ball and socket joint that will furnish a drip tight joint time and time again without excessive wrenching are illustrated and described with complete specifications in Dart Circular D-1. Cutaway pictures illustrate valves.

Fairbanks Co.



354—Gate Valves

Ludlow & Rensselaer bulletin A describes in detail double disc gate valves. Cutaway photographs show various parts and construction. Line drawings show the different types of valves with dimensions charted for each valve. Directions for ordering new valves and repair parts are given. Valves A.W.W.A. approved.

Ludlow Valve Manufacturing Co., Inc.



355—Altitude Control Valves

Altitude control valves are described in a new 16-page bulletin W-4-B. Standard single and double acting altitude valves are shown, along with differential, stop check, combination, electric, stop starter, and other special altitude valves. Complete parts lists, dimensions, and instructions given.

Golden-Anderson Valve Specialty Co.



356—Boiler Service Valves

Bulletin E125, 22 pages, "Everlasting Boiler Service Valves," contains quick and slow opening straightway valves—Model W, angle valves, "Y" valves, duplex blow-off units, water column valves—Model W, and fire protection valves—opening and closing types. Includes a full page of material specifications.

Everlasting Valve Co.



357—Water Coolers

This new 20-page, two-color booklet 892 describes the complete Ebco line of water coolers. Emphasis is placed on this company's new cooler which furnishes both hot and cold water permitting the making of beverages. Features of the cooler are described in words and pictures. Booklet also describes accessories.

Ebco Manufacturing Co.



358—Ball Socket Flexible Joints

Bulletin 229 describes methods for using ball-and-socket type flexible joints on guy wires, braces, or struts used to position stacks, vessels, piping, or tall columns subject to wind sway, vibration, or thermal movement. Flexible bracing maintains axial alignment while allowing free lateral movement.

Barco Manufacturing Co.



359—PVC Pipe

Revised edition contains new corrosion ratings, expanded information on thermal compensation, vacuum service, abrasion resistance. Installation and application sections have been enlarged. Diagrams illustrate joining of PVC to other piping materials. Includes dimensional data and working pressures for Schedule A tubing. A. M. Byers Co.



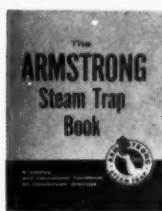
360—River Crossing Pipe

Booklet L-115 describes American "Molox" ball joint pipe for river crossings and other difficult installations. Map shows various locations of installations. Gives description, suggestions for use, method of assembling. Many pictures are used showing actual installing of pipe. Complete specifications on all diameters. American Cast Iron Pipe Co.



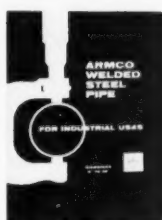
361—Eccentric Plug Valves

Catalog 54 contains a description of the exclusive eccentric design of DeZurik valves. Available in sizes from 1/2 thru 20 in. and with a full range of operators, DeZurik valves operate easily, close tightly without lubrication. Each type valve illustrated with photographs. Also diagrams with all dimensions. DeZurik Corp.



362—Steam Traps

Catalog K, the Armstrong steam trap book, has been revised and expanded to 48 pages. New material includes complete data on Armstrong open float and thermostatic steam traps; and strainers in 1/2 to 6-inch sizes in semi-steel; new pipe size tables; and additional data on trap selection. Armstrong Machine Works.



363—Welded Steel Pipe

Catalog 8558 describes the advantages of Aranco welded steel pipe for industrial uses. Contains pressure design data, tables, field curves, typical installations, and standard specifications. Pipe supplied with various coatings and linings, also hot-dip galvanized coating. Standard and special fittings, joints. Aranco Drainage & Metal Products, Inc.



364—Glass-Lined Sewer Pipe

Folder deals with the glass-lined sewer pipe with a mechanical joint. Amvit Glas-Glaz pipe is available in 4-ft lengths. It is root and infiltration proof and is glass lined inside and out. The pipe has been designed for an under-house drain and also as a house-to-street sewer. American Vitrifed Products Co.



365—Pipe, Fittings, and Valves

Bulletin J-57 describes pipe, welded steel fittings, spring loaded plug valves, and valves all jacketed, manufactured by Hetherington & Berner Inc. Different types of valves and fittings are illustrated together with cutaway photographs showing construction and operation. Also jacketed pumps and flexible hose. Hetherington & Berner Inc.



366—Ball Valves

Catalog 1000 covers full-bore and reduced port ball valves in steel and semi-steel. Complete specifications cover semi-steel ball valves, from 1/2 through 6 in., 200 to 400 lbs wog; ASA steel ball valves sizes 1/2 through 6 in.; ASA series 150; and 1/2 through 3 in. x 2 in. ASA 300.

W-K-M, Division of ACF Industries, Inc.



367—Rigid Plastic Pipe

Bulletin KT-2-58 provides complete technical data on the Kraloy PVC (polyvinyl chloride) rigid plastic pipe line. Physical, thermal, and miscellaneous information is included for pipe sizes from 3/8 to 10 in. diameters, as well as diameters, inside and out, wall thicknesses, maximum pressures, plus weight. Kraloy Plastic Pipe Company, Inc.



368—Centrifugal Separators

Bulletin 810 contains information on low cost centrifugal "T" type entrainment separators. Explains the advantages of the new type separator. Included are selection and capacity charts for both air and steam, complete specifications for three types of separators, and charts of separator and trap recommendations. Wright-Austin Co.



369—Pipes, Fittings, and Valves

Bulletin 139 describes Barnstead's complete line of tin-lined pipes, fittings, and valves. Combining the chemical protection of pure tin with the strength and durability of threaded pipe, this tin-lined equipment protects the purity of distilled water from the point of origin to the point of ultimate use. Barnstead Still & Sterilizer Co.



370—Steel Valves

Catalog 14 describes the complete Edward line of cast and forged steel valves for power, petroleum, chemical, marine, and industrial applications. Data includes ASA dimensions, ASA pressure-temperature ratings, and ASTM basic materials specifications.

Edward Valves, Inc., Subsidiary of Rockwell Manufacturing Co.



371—Process Piping Valves

New bulletin 115 covers some basic points to consider when selecting valves for process piping systems and emphasizes the many advantages and savings that can be made by the proper selection of valves to meet piping characteristics. Some typical process applications are also covered. Cut-away drawing shows valve operation. Hills-McCanna Co.



372—Safety and Relief Valves

Catalog 53 describes safety and relief valves in brass, bronze, iron, steel, stainless steel, and aluminum; for air, gas, steam, and liquid relief; 1/4 through 8 in. to 15,000 psig. Includes suggested applications, relieving capacity data and illustrations of typical units. Navy approved type valves featured. Kunkle Valve Co.



373—Stainless Steel Pipe Fittings

New 86-page master reference volume on stainless steel pipe fittings gives detailed information on broad line of IPS and tube O.D. fittings, ASA, MSS, and corrosion weight. Technical section includes manufacturing standards, specifications, corrosion-resistance tables, and data on welding of stainless steel.

Ladish Co.



374—Expansion Joints

New enlarged bulletin EJ-1916 gives complete data on Yarnway Type W Gun-Pakt expansion joints. Details of design and construction (including weights and dimensions in complete charts) are presented with instructions on figuring pipe-line expansion and best installation and maintenance procedures. Twelve pages.

Yarnall-Waring Co.



375—Forged Steel Valves and Fittings

Henry Vogt Machine Company has just released its new catalog of forged steel valves, fittings, flanges, and unions. Its 432 thumb indexed pages feature new types and trims to meet severe fluid and gas handling duties at all temperatures and pressures. A permanent book containing complete information.

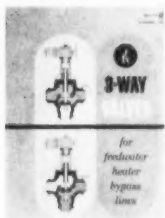
Henry Vogt Machine Co.



376—Plug Valves

Twelve-page catalog 581 GP contains specifications of all sizes (1 to 4 in.) and pressures (1000 psi to 10,000 psi CWP) of Graham nonlubricated plug valves. Cutaway view shows construction details of this round port, full opening valve. Photos of all valves; parts lists; body and trim materials also included.

Texstream Corp.



377—Three-Way Valves

Bulletin 8F describes line of three-way valves offering considerable installation savings over conventional two-way types. Installed at a heater bypass connection on the heater inlet or outlet side, these valves can replace two gate valves, one tee fitting, and eliminate four welded connections. Operation diagrammed.

Schutte and Koerting Co.



378—Lightweight Plastic Pipe

Bulletin describes Southwestern lightweight plastic pipe. This pipe is easy to handle, store, and transport. It is simple to install, resists chemicals; is unaffected by electrolytic corrosion; reduces installation and maintenance costs. Available in all sizes with ready-to-use fittings. NSF approved for drinking water.

Southwestern Plastic Pipe Co.

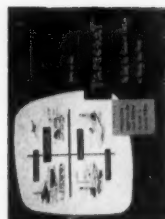


379—Stainless Steel Pipe Fittings

This 22-page catalog explains how Speedline stainless steel fittings reduce piping costs by allowing the designer to take advantage of the new and more economical schedules 5 and 10 stainless steel pipe. A schematic drawing illustrates industrial applications.

Speedline Stainless Steel Fittings Div.,

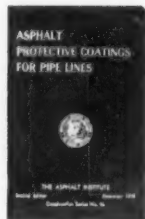
Horace T. Potts Co.



380—Pipe Protection

Hot coal-tar protection in easy-to-apply tape form for pipe, pipe fittings and joints, conduit, cable, insulated pipe, tie rods. Material is heated lightly to soften the pitch, then spirally wrapped onto pipe surface. Tapecoat provides long-life protection that is equivalent to a hot applied coal-tar pipeline coating.

Tapecoat Co.



381—Asphalt Pipe Coating

A new edition of "Asphalt Protective Coatings for Pipe Lines" is available. Most significant change in the 64-page publication is a reduction to three of the major classifications of asphalt protective coatings for pipe lines. It describes wrapped systems, mastic systems, and coatings for interior surfaces.

Asphalt Institute.



382—Motorized Valves

Bulletin 21-58 describes the new Type P-2 LimiTorque motorized valve operator for small globe and gate valves. A compact, economical, and dependable operator for use on valve, either new or already in service. Photographs and diagrams show operation and construction.

LimiTorque Corp., Division of Philadelphia Gear Corp.



383—Liquid Strainers

Bulletin 6 deals with liquid strainers, single and duplex, for pressures from gravity to 900 psi. Capacities from 6 to 7500 gpm of water or 50 viscosity oil at 6 psi pressure drop. Mesh size 8 to 200, depending on liquid and contaminant. Strainer basket catches all contaminant; none is left in shell or piping.

William W. Nugent Co., Inc.



384—Automatic Butterfly Valves

Bulletin 581 describes manual and automatic, rubber-seated type butterfly valves. These valves, for water works service, are built to conform with American Water Works Association specifications in all respects. Photographs and diagrams show the many features of this ruggedly constructed valve.

W. S. Rockwell Co.



385—Water Coolers

Illustrated specification sheet gives details on water coolers, for use with new or existing wall fountains, for restaurant serving counters and overhead wall brackets. Serves 60 people hourly. Quarter-horsepower fan-cooled condenser. Typical engineer's specifications, table of capacities, and dimensional drawings.

Temprite Products Corp.



386—Lubricated Plug Valves

Catalog PV-5 shows the full line of Powell steel and semi-steel lubricated plug valves, wrench and gear operated. The various types are illustrated in color; and available sizes, pressures, and complete dimensions are given. Accessories, lubricant recommendations, and maintenance suggestions included.

Wm. Powell Co.



387—Valve Comparison Chart

"OIC Diamond Anniversary Valve Comparison Chart," bulletin 194-R2, recently complete, covers the latest models of new valve designs manufactured by each company in the valve business. It lists, for the first time, a complete valve trim comparison table. The chart is arranged for easy cross-reference.

Ohio Injector Co.



388—Steel Fittings

Catalog H-1 provides information about the complete "Husky" line of low-pressure 150 lb carbon steel fittings: straight tees, 90° elbows, 45° elbows, and reducers. Practical advantages of "Husky" fittings are included. Also shown are Schedule 40 and Schedule 80 high pressure specification tees. Specifications.

NIBCO Inc.



389—Fabricated Pipe Fittings

Bulletin 525 illustrates standard and special fabricated fittings which help in planning piping and equipment layouts. Data includes specifications and prints on standard fittings for lightweight pipe. The bulletin also illustrates special fabrications designed to save time and labor.

Naylor Pipe Co.



390—Flush Valve System

New folder details construction and functions of new Haws-Kramer "Silent-Service" flush valve system, the first practical for home installation. Insures extremely quiet, easier maintenance, safer sanitation. All concealed in wall; for use with new wall-hung closets; push-button operation. Detail drawings.

Haws Drinking Faucet Co.



391—Relief Valves

New 8-page bulletin W-2A describes Golden-Anderson cushioned surge relief valves in sizes 1/2 to 36 in. These valves are used to protect water lines against excessive pressures caused by surges in the system. Installation arrangements, parts lists, dimensions, and specifications included.

Golden-Anderson Valve Specialty Co.



392—Wrought Iron Pipe

Comprehensive 64-page booklet discusses 4-D wrought iron pipe for downspouts, soil, waste, and vent lines. Includes sections on corrosive conditions, comparative service, Durham systems, cost considerations, and specifying data. Photographs of vent corrosion accompany two building piping surveys.

A. M. Byers Co.



393—Vitrified Clay Pipe

Jointed vitrified clay pipe known as Amvit, with a built-in mechanical joint made from polyvinyl chloride, is described in four-page folder. Advantages such as infiltration prevention, quick installation, immediate backfilling, better flow, shock absorption, and quick testing in the field are pointed out.

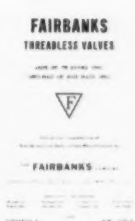
American Vitrified Products Co.



394—PVC Pipe

Bulletin PF 1200, eight pages, presents a list of applications for PVC pipe and fittings where corrosion resistance, non-toxicity, and noncontamination are required. Mechanical, electrical, thermal, and miscellaneous properties of both normal impact and high impact PVC products are in table form.

Luzerne Rubber Co.



395—Threadless Bronze Valves

The applications of Fairbanks solder end and Fairco-Braze threadless bronze valves are furnished in this brochure along with the descriptions and complete specifications. Solder end valves for soldered joints. Fairco-Braze valves, for silver bronzed joints. Includes dimensions and installation procedure.

Fairbanks Co.



396—Motorized Valve Operator

Bulletin 20-58 describes the LiniTorque motorized valve operator for actuation of plug valves. A simple, easily installed unit that can be built either to NEMA IV or NEMA VII standards. The linear operator is supplied with all necessary adapting parts. Fully illustrated.

LiniTorque Corp., Division of Philadelphia Gear Corp.



397—General Service Valves

Dimensions and detail drawings plus a parts list are included in 20-page bulletin E-165. Bulletin discusses class 125 single and double disc, class 250, cylinder-operated valves, lubricated valves, valves for emergency protection, steam-jacketed valves, and valves for boiler blow-off. Fully illustrated.

Everlasting Valve Co.



398—"Hot'n Cold" Water Coolers

Booklet entitled "How to cut coffee-break time in half" is offered by Ebco. This booklet describes the new Hot'n Cold water cooler with a beverage locker. Complete line of Hot'n Cold coolers are illustrated. Also shown in pictures are the various applications. Shown in chart form are possible yearly savings.

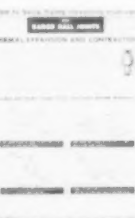
Ebco Manufacturing Co.



399—Rotary Valve Drainers

Bulletin 5201-A describes ball-float-actuated rotary valve drainers. Units are high-capacity, continuous discharge type suitable for steam, compressed air, and gas. Can handle heavy condensate flow or drippings, visual indication of proper functioning, and lever for manual closing or blow-off. Capacities and dimensions.

Cochrane Corp.



400—Flexible Ball Joints

Bulletin 31 contains layout diagrams, photographs, and data on how to solve problems of thermal expansion and contraction in piping economically with flexible ball joints. Applicable to piping runs of any length and of any diameter from 1/4 inch to 12 inches, including high temperature steel piping.

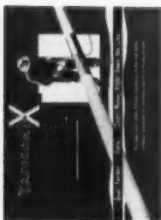
Barco Manufacturing Co.



401—"Impactgear"

Catalog 14-C describes the new "Impactgear," a ring gear and pinion assembly permitting a man with a portable power wrench to operate large cast steel globe valves without assistance. Can be fitted to any 10-, 12-, or 16-inch valve of 900 psi or higher pressure.

Edward Valves, Inc., subsidiary of Rockwell Manufacturing Co.



402—Pipe Protection Tape

Tapecoat X is a coal-tar protective coating in tape form for pipe, pipe fittings and joints, conduit, cable, insulated pipe, tie rods. Material is heated lightly with a torch, then wrapped onto pipe surface with one-half inch overlap. Provides protection on underground pipe equivalent to hot-applied coal tar.

Tapecoat Co.



403—Pipe, Castings and Fittings

Catalog L-127 describes the complete line of American ductile iron pipe, tubing, casing, fittings, and special castings. Includes valuable technical information; grades, specifications, dimensions, and weights. Typical applications include underground piping, industrial piping, well casing, and many others.

American Cast Iron Pipe Co.



404—Steam Traps

Bulletin 808 describes the new 500-C series steam traps, combination open float and thermostatic type. Cutaway drawings show both thermostat and bucket operation. Photographs show accessibility of parts for service. Gives specifications needed for ordering. Included are capacity data and specifications.

Wright-Austin Co.

PLANT SITE



405—Plant Sites

"Look Where a Site is Production-Right," 24-page brochure, presents data useful to consultants and executives responsible for new plant location. Illustrated with colored maps, it describes power, fuel, labor, water, weather, key materials, transportation, and plant sites that offer best plant site possibilities.

Baltimore & Ohio Railroad.



406—Industrial Opportunities

A colorful new presentation of Colorado's industrial opportunities. Included are booklets on manufacturing, power, raw materials and resources, transportation, markets and labor, Colorado living, industrial site locations, state highway map, and full color recreation booklet. Up-to-the-minute data in portfolio form.

Colorado Department of Development.

POWER EQUIPMENT AND FUELS



407—Heat Recovery Snubbers

Bulletin 272 describes the Burgess-Manning line of heat recovery snubbers. Heat recovery up to 1500 Btu/bhp/hr can be obtained with a circulating water pump in the system. Standard 2-chamber snubber design plus reduction of gas volume by cooling provides a high degree of silencing.

Burgess-Manning Co.



408—Preheaters

The important points to consider in selecting a preheater for use with small boilers (25,000 to 250,000 lbs per hr) are discussed in four-page bulletin on the new package Ljungstrom air preheater. Explains how preheater saves fuel, increases boiler output and reliability, and permits use of lower grade fuels.

Air Preheater Corp.



409—Complete Package Boiler

Bulletin MR-1A announces the new compact Model "R" Amesteam Generator, a complete package boiler available in sizes ranging from 10 hp through 600 hp. Oil or gas fired. Each unit is completely equipped with all necessary boiler fittings, is guaranteed to operate at 80 percent thermal efficiency.

Ames Iron Works.



410—Matched Boiler-Burner

Illustrated, full-color literature covers the 52 to 651 hp series of Kewanee-Iron Fireman forced-draft packages for all types of gas and all grades of oil, or combination firing of both. Advantages of design, construction, and operation are given, plus cutaway model view, ratings, and over-all dimensions.

American-Standard, Industrial Division.



411—Package Boilers

A completely new line of low and high pressure forced draft water tube packaged boilers is described in bulletin 1400. Known as the Compak series, these factory-tested units are offered in 22 sizes ranging in capacity from 12 through 750 horsepower. Engineering specifications with catalog literature.

International Boiler Works Co.



412—Spreader Stoker

Bulletin 800 describes and illustrates the Detroit RotoStoker "CC" — a spreader stoker with overthrow rotor feeders. The unique design reciprocating grate continuously discharge ash at the front. Smokeless operation . . . burns a wide variety of coals. For boiler capacities to 75,000 pounds of steam per hour.

Detroit Stoker Co.



413—Packaged Boilers

Catalog AD 137 describes the CB Progress and Monitor boilers. Advantages of four pass, forced draft design, oil, gas, or combination fired are described. Specifications, ratings, and dimensions are given as well as recommended boiler room layouts. Completely packaged units to fit every installation.

Cleaver-Brooks Co.



414—Packaged Boilers

"Package Boiler Economy for Modern Hot Water Systems," describes Cyclotherm's Cyclonic Combustion, a patented principle, now incorporated in a design to efficiently produce hot water. No other type boiler can match the package unit for economy of space and fuel.

Cyclotherm Division

National-U.S. Radiator Corp.



415—Automatic Coal Firing Unit

A compact, automatic coal firing unit for installations of 175 hp to 350,000 pounds of steam per hour and upward. Engineered for top efficiency with both low and high ash coals. Exclusive conveyor feeder won't clog and provides even distribution throughout entire range, 50 to 7500 lbs coal per hr.

American Engineering Co.



416—Burners

Form 5808 describes light oil, gas, and dual-fuel oil gas burner designed for operation against firebox pressure. Fires number 2 fuel oil and/or natural or LP gas. Special burner head produces high combustion efficiency and prevents flame pulsation. Models available for firing pressurized or natural draft boilers.

Iron Fireman Manufacturing Co.



417—Hydraulic Turbines

Details on the Leffel turbines that drive both power generation and pumping units at the United States Bureau of Reclamation Chandler Power and Pumping Plant in the state of Washington are given in 12-page bulletin 1098-E. Literature on other Leffel turbine installations will be enclosed.

James Leffel & Co.



418—Forced Draft Burner

Bulletin describes compact forced draft package unit burner. This single, coordinated, factory-tested assembly, ready for attachment to boiler, combines all necessary equipment for burning oil or gas fuels. Gives details of design and features. Diagrams are keyed to chart giving dimensions for all models.

S. T. Johnson Co.



419—Burner Equipment

This new 16-page booklet illustrates and describes Ray Burner equipment for firing oil, gas, or combination oil or gas: manual, semiautomatic, and fully automatic models; rotary, pressure atomizing, inshot gas, packaged forced draft boiler-burner units. A burner for every domestic, commercial, or industrial need.

Ray Burner Co.



420—Commercial-Industrial Burners

Twenty-page catalog describes Petro commercial-industrial oil, gas, and dual fuel burners used for heating, power, and process steam requirements. Includes section on "How to Select a Burner." Illustrates several typical installations and various burners, from 8 through 200 gal per hr oil capacity.

Petro.



421—Steam Generators

New bulletin B-3250B describes and pictures Titusville's Ticotherm steam generators. Insert sheet gives complete data on sizes. These generators are of water-tube design, ideal for use in boiler rooms where limited floor space and headroom are important factors. Completely insulated at top, sides, and rear.

Titusville Iron Works Co.



422—Mobile Generating Plants

Trailer mounted mobile generating plants, complete rolling power stations, are described in this plastic-bound handbook. For temporary tie-in, or semipermanent installation, diesel or dual fuel operation, these mobile plants may be practical. In four sizes: 350, 500, 1000, and 1250 kw.

White Diesel Engine Division,

White Motor Co.



423—Heat Recovery Silencers

A 12-page bulletin gives full information on Maxim heat recovery silencers, used to produce steam or hot water for heating or processing operations. Engineering data includes descriptions, capacities, installation, blueprints, cutaways, dimensions. Typical installations are described, complete with layouts.

Enhart Mfg. Co., Maxim Division.

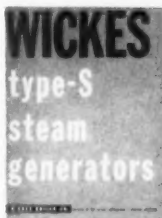


424—Induced Draft Fans

Bulletin L-3 covers the complete line of centrifugal induced draft fans. Included are rating tables shown at 600 F, dimension data, construction material specifications, recommended sizes of fans for oil, gas, or coal fired boilers. Typical installations are also shown.

Lehigh Fan & Blower Division,

Fuller Co.



425—Steam Generators

Wickes type-S steam generators, two-drum, water tube boilers built to a design pressure of 725 psi, are described in catalog 55-2. These units combine the water cooled furnace as an integral part of the boiler, adapting the high and low type furnace to the desired type of firing — coal, oil, or gas.

Wickes Boiler Co.



426—Integral-Furnace Boiler

Bulletin G-94 describes B&W's newest integral-furnace boiler, Type PFI. This new pressurized-furnace, oil and gas fired steam generator is designed for power, process, or heating loads requiring steam capacities up to 400,000 pounds per hour at pressures to 1150 psi and steam temperatures to 900 F.

Babcock & Wilcox Co.



427—Automatic Boilers

Bulletin BE-200 illustrates and describes the free, rapid circulation of boiler water in Continental Automatic Boilers, which equalizes temperatures in the boiler, and insures fast heat absorption. May be operated at either high or low water differential temperatures. Eliminates entrapped air from system water.

Boiler Engineering & Supply Co., Inc.



428—Package Boilers

Catalog VP-3, 16 pages, describes the new Type VP package boiler. Following a section of background information is an outline of principal design features. These boilers are shop assembled and provide steam capacities from 4000 to 90,000 lb per hr. Space requirements and specifications are in table form.

Combustion Engineering, Inc.



429—Gas and Gasoline Engines

Bulletin SA-542-E describes the V-122 and the V-125 twelve-cylinder gas or gasoline engines manufactured by the Climax Division of Waukesha Motor Co. These engines develop a maximum of 520 and 610 horsepower respectively. Engines combine simple rugged construction with smooth running.

Climax Engine Manufacturing Co.



430—Shot Cleaning System

Bulletin 2145 covers the new Diamond shot cleaning system for the most efficient and economical cleaning of such external horizontal tube surfaces as superheaters, reheaters, economizers, and air heaters. Gives advantages, principles, construction, and operation. Chart shows draft loss from ineffective cleaning.

Diamond Power Specialty Corp.



431—Smokestacks

Bulletin SS-202A describes Permugas smokestacks, protected against corrosive flue gases. Features include longer life, low maintenance, lightweight, and easy installation. Chart shows how Permugas stacks cost less over a period of years. Special Permugas sections, smokestack accessories, and typical installations.

A. O. Smith Corp.



432—Boiler Blowdown System

Bulletin 8001 introduces the Schaub console continuous blowdown system, first fully automated "total function" boiler blowdown and sampling system — completely packaged and pre-engineered. Available to handle two, three, or four boilers (250 or 600 psi working pressure) capacities to 6000 lbs per hr.

Fred H. Schaub Engineering Co.



433—Pipe Flange Gaskets

Condensed general catalog describes and illustrates pipe flange gaskets, including compression-gage type, self-centering type, and gaskets for recessed fittings. Also shows gaskets for boiler manhole cover assemblies, and boiler handhole and tubecap cover assemblies. Illustrated with photographs.

Flexitall Gasket Co.



434—Packaged Boilers

Twelve-page catalog describes Type AS Superior packaged boilers for capacities from 4000 to 13,000 lbs steam per hr. Complete packages with rotary burners, integrated controls, soot blowers, refractory, and insulation, these units also have quiet rear mounted draft fan which provides air-cooling of furnace floor.

Superior Combustion Industries, Inc.



435—Steam Turbines

A collection of twenty bulletins, illustrating and describing Terry solid-wheel, helical-flow turbines; single-stage and multistage axial-flow turbines; and a number of different types of governors for various applications. Approximate dimensions are included for many of the types and sizes of turbines described.

Terry Steam Turbine Co.



436—Steam Generators

Bulletin 100B, eight pages, illustrates and describes steam generators available from 10 to 160 hp, producing 300 to 5000 lbs steam per hr at pressures from 15 to 600 psi. Flow diagram; data and specifications for standard and high pressure units with cycling and modulating controls; cutaway view of unit also included.

Texteam Corp.



437—Steam Generators

Bulletin PSG-2, 10 pages, presents design and construction details, tables of capacities, dimensions, and weights of package unit type steam generators. Available in three standard pressures of 175, 250, and 375 psig, the boilers are designed to be used with different types of firing and control equipment.

Henry Vogt Machine Co.



438—Turbogenerators

Booklet describes the back pressure turbogenerator manufactured by STAL, a subsidiary of ASEA Electric, Inc. Various operations are pictured in multi-colored diagrams, as are the oiling and governing systems. Versatility shown by variety of applications described. Installation pictures and drawings.

ASEA Electric, Inc.



439—Stoker Instruction Wall Chart

Chart printed in two colors on heavy paper stock for display in boiler rooms. One side contains detailed instructions for operation of single-retort underfeed stokers; reverse side summarizes directions for starting fire, cleaning fire, and restoring fuel bed. The key points are illustrated for proper operation.

Bituminous Coal Institute.

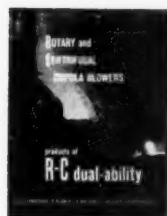


440—Mechanical Draft Fans

Catalog 1361, titled "Heavy Duty Mechanical Draft Fans," describes the series 7000 centrifugal fans, which are designed for handling abrasive gases at elevated temperatures. Complete application, performance, and physical data. Optional accessories are listed.

Westinghouse Electric Corp.

Sturtevant Division.



441—Iron Cupolas

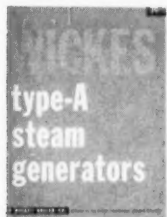
Covering all FEMA listed standard sizes of iron cupolas, new bulletin FC-158 gives optional recommendations for air blowers of either positive displacement or centrifugal type. Performance data is provided for all units at representative operating conditions. Automatic control for constant air weight is also offered. *Roots-Connorsville Blower Div.*



442—Burners

All new 16-page bulletin B1 illustrates and describes the complete Webster line of 13 basic types of gas, oil, and combination burners together with recommended uses. Also covered are specifications, accessories, automatic combustion controls, and electronic safeguard equipment.

Webster Engineering Corp.



443—Steam Generators

Wickes type-A steam generators, compact, efficient, shop assembled water tube boilers, are illustrated and described in catalog 56-1. It gives typical superheater arrangements for the boilers with section, plan, and side views of drainable "S", pendant, and drainable superheaters. Specifications are given.

Wickes Boiler Co.



444—Steam Generators

Bulletin B-3255 describes the Titusville type WTP steam generators. Can be fired with heavy oil, heavy oil and gas, light oil, light oil and gas, and any type of gas. Steam capacities are from 10,000 to 60,000 lb per hour. Generators meet ASME code requirements. Included are photographs showing inner construction.

Titusville Iron Works Co.



445—Diesel Engines

Complete 80-page catalog includes power curves, sectional drawings, and sub-assembly photographs of six basic engines in 19 models, a power range of 100 to 2150 bhp. Diesel, gas, and dual fuel engines and generator sets are available as a custom installation.

*White Diesel Engine Division,
White Motor Co.*



446—Three-Pass Package Boilers

Weeco-Ray automatic 3-pass packaged boilers for heating, power, and process steam are featured in the 1958 Weeco catalog. Ratings, data, dimensions, installation details, and other specification data are given in this 8-page booklet. Capacities of these packaged units range from 25 to 600 boiler hp.

Western Boiler Co.



447—Burner

Factory engineered and built integral air register for control of combustion air is feature of Petro WR burner. Register controls entire air supply for maximum combustion efficiency. Models available for firing all fuel oils, including number 6, and for dual fuel oil-gas firing. For Scotch or firebox boilers.

Petro.



448—Rotary Burners

Bulletin describes Johnson Model 53 fully automatic metering pump rotary burners. This burner insures smooth, automatic starts even after lengthy shut downs. Available in nominal sizes ranging from 25 hp to 400 hp, with each having a maximum capacity of 125% of its nominal rating. Dimensions given.

S. T. Johnson Co.



449—Scotch Boilers

Complete descriptive and specification information on rugged Scotch boilers for gas, oil, and coal firing, and automatic underfeed stokers for Scotch type boilers, is given in 28-page bulletin 236. This illustrated brochure includes test results, performance data, and details of design and construction.

James Leffel & Co.



450—Gas-Oil Burners

A variety of oil and combination gas-oil burners are included in illustrated 24-page bulletin 5629. It describes rotary air burners, firing units with integral air registers, complete package units with factory control panels. The Oil Volumeter that provides steady, uniform oil flow with any oil is shown.

Iron Fireman Manufacturing Co.



451—Steam Generators

Bulletin GB-1 gives testimonial proof of the value-packed Amesteam generator, packaged firetube boiler. Sizes available: 10 through 600 horsepower; 15 through 250 pounds design pressure. Lists well-known users with photographs of actual installations. Illustrated literature available upon request.

Ames Iron Works.



452—Vibrating Grate Stoker

A water cooled vibrating grate stoker (sizes from 25,000 to 150,000 pounds of steam per hour) that does not require a dust collector and assures freedom from smoke, even at low ratings. Burns low grade coals with top efficiency and is easily adapted for burning gas or oil in combination with coal, or singly.

American Engineering Co.



453—Water Separator Snubbers

B/M "WSS" water separator snubbers are designed to extract 100% of the liquid water from water-sealed vacuum pump exhausts and simultaneously reduce noise of the gas discharge to an ear-comfort level. Used with water for cooling exhaust gases to a safe level where explosive substances are handled.

Burgess-Manning Co.



454—Aftercoolers and Separators

Bulletin 712 is a 10-page technical book on aftercoolers particularly for the consultant. Cutaway drawings in three colors help explain the operation. Benefits to be obtained from dry compressed air are given along with chart showing moisture left in given volume of air at pressure. Selection charts and installations.

R. P. Adams Co., Inc.



455—Package Boiler and Burner

Design, construction, operation, and advantages of Kewanee-Petro forced-draft packages are covered in a full-color, illustrated literature piece. Units in the 52 to 651 hp series are covered, both low pressure and high pressure, firing all types of gas and all grades of oil, or both in combination.

American-Standard, Industrial Division.



456—Spreader Stokers

New bulletin 860 illustrates and describes the Detroit RotoStoker, a spreader stoker with overthrow rotor feeders. For use with medium size boilers up to about 60,000 pounds of steam per hour capacity. Power dumping, hand dumping, or stationary grates. May be installed in almost any type boiler.

Detroit Stoker Co.



457—Recirculation Generators

Basic advantages of the Type LFW forced recirculation generators for high temperature water are given in ten-page bulletin 700. Chart compares capital investment, operating costs, and maintenance and repairs for high temperature water and high pressure steam for district heating from central plant.

International Boiler Works Co.



458—Package Steam Generators

New six-page bulletin entitled "More Performance From Less Investment" describes in detail Cyclotherm's line of 18 sizes of package steam generators, 15 hp to 650 hp. Also specifications, on 10 sizes of new package hot water generators, 670 mbh to 6700 mbh.

Cyclotherm Division

National-U.S. Radiator Corp

PROCESS EQUIPMENT



459—"Thermo-Panel" Coils

Bulletin 355 is a 52-page treatise on Dean Thermo-Panel Coils which "Take The Place Of Pipe Coils." Includes information on construction, specifications, standard types, curved panels, styles of embossings, materials, coatings, pressures, heat transfer, weight, capacity.

Dean Products, Inc.,

Dean Thermo-Panel Coil Division.



463—"Fluidometer"

Bulletin FL-56 describes Hetherington & Berner's Fluidometer, an automatic batch metering system. Adoptable to practically any liquid measuring problem. Equally accurate with high or low viscosities, eliminating waste. Shown in photo and diagram are direct control, remote control, dual valve, and multi-valve systems.

Hetherington & Berner Inc.



460—Air Classifier

Bulletin AH-449 describes in detail the new "Gyrotor" air classifier for use in continuous separation of coarse and fine air-borne particles. Can be used in closed circuit with a pulverizing mill or as a self-contained sizing unit for any moving stream of air-solids mixture. Includes cutaway drawings, photographs.

Hardinge Co., Inc.



464—Materials Handling, Processing

Fully illustrated brochure 182, 36 pages, presents a report of R&S diversified services for coal and iron ore mining, steel mills, and railroads. It features materials handling and processing facilities; also ore beneficiation plants aside from specialized coal preparation plants and fabrication in well equipped shops.

Roberts & Schaefer Co.



461—Multi-Zone "Platecoil"

Bulletin 159, 48 pages, completely describes new Multi-Zone Platecoil, covering styles, dimensions, specifications, and operational data. Methods of calculating heat transfer equipment requirements are outlined. Typical installations are pictured and described. Available on request.

Tranter Manufacturing Co., Inc.



465—Molded Rubber Parts

Catalog describes products and equipment of the Goodyear Rubber Company, not to be confused by any other company of similar name. This booklet primarily shows company facilities as products are made to customer requirements. Mechanical rubber products, hose, rolls, molded and extruded rubber products.

Goodyear Rubber Co.



462—Industrial Equipment

The complete line of Mahon industrial equipment is described in 12-page catalog A659, including finishing systems; metal pickling, cleaning, and rust proofing equipment; drying and baking ovens; spray booths; sludge segregators and unloaders; filtered air supply systems; dust collectors and fog filters.

R. C. Mahon Co.



466—Blowers

The Spencer Turbine Company's bulletin 142-B describes and pictures the company's line of blowers for use on industrial and municipal applications (particularly sewage treatment plants) wherever delivery of clean air is required. Features and advantages of the Spencer turbine type blowers are described.

Spencer Turbine Co.



467—Machine Design Award Program

Brochure gives rules of a competition for papers describing the use and advantages of welded design in machinery or machine components of all types. Program offers 54 awards totaling \$50,000. Top award is \$10,000. Weldment described can be redesigned or a new design.

James F. Lincoln

Arc Welding Foundation



468—Packaged Grinding Plant

Design features and operating advantages of a new packaged grinding plant are described in bulletin 07B7138. This new unit can be used for a wide variety of fine grinding applications. Heart of the process is a new vibrating mill capable of producing 15 to 30 times more than conventional mills.

Allis-Chalmers Manufacturing Co.



469—"Platecoil"

This bulletin, 59-PI, describes and illustrates the new Platecoil configuration. It contains pertinent information on construction, application, and advantages in heat transfer. Specifications, size, weight, and surface area of standard units are listed. Varied applications are pictured and discussed.

Tranter Manufacturing Co., Inc.



470—"Thermo-Panel" Coil Data

Prices and data on Dean Thermo-Panel Coils which "Take The Place Of Pipe Coils" for industrial heating and cooling processes. Bulletin 258 shows how to do your own estimating. Zinc metallizing; edge sealing; double and single embossed; heat transfer.

Dean Products, Inc.

Dean Thermo-Panel Coil Division.



471—Chemical Process Equipment

WC-120 describes the complete line of chemical process equipment available to industry for maximum product purification, more advanced processing techniques, recovery of process by-products, and recovery of valuable materials. Equipment includes ion exchangers, sedimentation units, filtration units.

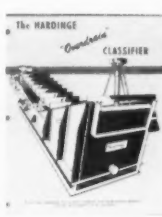
Graver Water Conditioning Co.



472—Air Preheater

Brochure entitled "The Ljungstrom Air Pre-Heater for Process Equipment" describes the fuel economy possible with this regenerator. Table of comparative fuel and power costs and graph clearly show these economies. Explains how added furnace capacity gives increased production and higher quality.

Air Preheater Corp.



473—Overdrain Classifier

Bulletin AH-478 describes Harding's latest development, the Overdrain Classifier. It is a completely new device in the field of belt-type wet classifiers. Belt moves upwardly out of sand bed. Surplus liquid and slimes discharge through overdrain holes without mixing with oncoming sands. Operation illustrated.

Hardinge Co., Inc.



474—Products and Production

Catalog "This is RECO" describes RECO products, production, and design service in detail. Photographs, listing of practical dimensions, materials, special linings, specifications are shown for pressure vessels, storage tanks, process heat exchangers, pipe, duct, towers, columns, and autoclaves.

Richmond Engineering Co., Inc.

PUMPS AND COMPRESSORS



475—Centrifugal Pumps

Bulletin 100 describes the complete line of centrifugal Type AC pumps for the air conditioning industry. Selection table for sizing from 10 to 260 gpm against heads up to 150 feet is given. Complete performance curves for all models are listed together with principal dimensions. Pumps can be mounted in any position.

Weinman Pump Mfg. Co.



476—Small Engine Compressor

Bulletin S-550-B27 describes Worthington's SLHC modern small engine compressor. The supercharged four-cycle unit is very compact making it the lowest in cost for fabrication, installation, or moving. Features are pictured and described. Colorful cutaway photograph shows operation. Manual or automatic.

Worthington Corp.



477—Rotary Pumps

Catalog 59-S includes illustrations and specifications on general purpose and heavy-duty Viking rotary pumps. Also includes data on many special rotary pump units. A complete list of district offices and distributors reveals where additional information can be obtained promptly.

Viking Pump Co.



478—Submersible Pumps

Bulletin B1000 describes the Sumo line of high capacity submersible pumps for 6 in. and larger wells. These pumps are designed to meet large scale water needs including service as booster pumps, municipal water supply, schools and institutions, industry, irrigation, and commercial buildings.

Sumo Pumps, Inc.



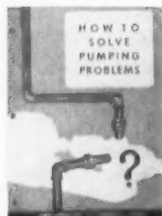
479—Gas and Vacuum Pumps

California series rotary positive blowers, gas pumps, and vacuum pumps are described in bulletin S-59G with dimension drawings and capacity tables. For volumes up to 2480 cfm single stage with pressures to 10 psi or vacuums to 20 in. Hg. Features anti-friction bearings, wide-face timing gears, oil-free operation. *Sutorbilt Corp.*



480—Screw Pumps

Bulletins SE-5 and SI-6 describe line of screw pumps for heavy duty pumping of lubricating and nonlubricating fluids and semi-fluids, from 32 to 1,000,000 ssu; capacities 1 to 1000 gpm; discharge 1000 psi for viscous liquids, 500 psi for water. Internal or external bearing types, vertical or horizontal available. *Sier-Bath Gear & Pump Co., Inc.*



481—Pumping Problems

"How to Solve Pumping Problems," 36-page instruction manual, covers important fundamentals of estimating requirements of the average pumping job. It contains sample problems on hydraulic systems, general transfer, and pressure transfer, plus tables, charts, and other pertinent engineering data. *Roper Hydraulics, Inc.*



482—Power Plant Pumps

Easy-to-use Engineer's Guide gives condensed description, specifications, selection, and dimensional data on Roth turbine power plant pumps and packaged boiler feed and condensate return units. Full information on Roth certified hot water performance and 10 year shaft guarantee. Cover is pictorial index. *Roy E. Roth Co.*



483—Pumps

Peerless PR (packing gland construction) and PRS (mechanical shaft seal construction) pumps are designed to handle to 1200 gpm with heads to 700 feet. Type PR handle temperatures to 850F, while the PRS is designed to 250F. Center line mount types. *Peerless Pump Div.,*

Food Machinery & Chemical Corp.



484—Turbine Pumps

New bulletin describes the Type G deep-well turbine pump designed by Byron Jackson Pumps, Inc. The new pump is designed for general application by farmers, industry, municipalities, and other primary water supply users. Parts for any size Type G are interchangeable. Cutaway drawings show construction. *Byron Jackson Pumps, Inc.*



485—Single Suction Pumps

New bulletin 976-G gives complete specifications on full ball bearing single suction pumps. Use includes handling saturated refrigerants and saturated liquids in air conditioning, viscous fluids in petrochemical and process industries, corrosive liquids, general water supply, and many others. *Buffalo Forge Co.*



486—Industrial Pumps

Catalog describes uses and construction of new Floway line of industrial pumps manufactured by Fiese & Firstenberger. Capacity range is from 15 to 4000 gpm. Floway vertical turbine pumps are designed for every industrial and municipal pumping need and for every pumping condition.

Fiese & Firstenberger Mfg., Inc.



487—Centrifugal Pumps

Bulletin 1002 describes single stage, single and double suction centrifugal pumps. Cutaway photographs show types G and I single suction pumps with capacity range from 50 gpm to 600 gpm and types G, I, and K double suction pumps with capacity range from 175 gpm to 600 gpm. Capacities and dimensions. *De Laval Steam Turbine Co.*



488—Centrifugal Pumps

Bulletin 720.4 describes full line of end suction, open impeller centrifugal pumps in sizes 1 1/4 to 8 in. with capacities up to 3000 gpm; heads up to 180 ft. Handles solids up to 2 3/4 in. diameter. Wide range of interchangeability — minimum inventory of spare parts. Certain sizes available in stainless steel. *Goulds Pumps, Inc.*



489—Vertical Pumps

Bulletin 1610 describes the Type U-VB vertical nonlog pump. This pump is ideal for dry pit installation when necessary to install motor a considerable distance above pump. Cutaway view of pump construction together with principal dimensions are given. Pumps available in various head capacities. *Weinman Pump Mfg. Co.*



490—Steam or Air Pumps

Bulletin 270 describes American-Marsh simplex steam or air driven pumps for hydraulic pressure testing; for working pressures from 2500 to 10,000 psi, on steam or compressed air from 50 psi and up. Large selection of materials and sizes. Outside end packed plunger type with double acting fluid cylinders. *American-Marsh Pumps, Inc.*



491—Trash-Sewage Pumps

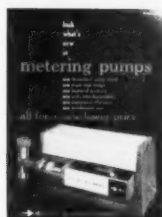
Bulletin on nonclogging, high and dry, open impeller, trash-sewage pumps. These self-priming centrifugals are available in 3, 4, and 6 in. sizes. Feature the ability to handle solids up to 1 1/2, 2, and 2 1/2 inches in diameter. These pumps are useful in dewatering, sewage, and industrial sump applications. *Gorman-Rupp Co.*



492—Duplex Steam Pumps

The Type B Wagener duplex pump, suitable for asphalt, molasses, syrup, lard, mash, sewage, heavy oil, and other liquids over 1000 ssu, is described in four-page bulletin WS-46. Specifications, dimensions, and table of standard sizes are provided.

*Wagener Pump Division,
Canton Stoker Corp.*



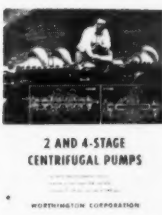
493—Metering Pumps

Catalog 900 describes the new line of Masterline metering and proportioning pumps. Available in four models with capacities to 1030 gph. New crank design features improved accuracy, parts interchangeability, operational efficiency, and ease of maintenance. Also featured is the new streamlined safety shield.
Hills-McCanna Co.



494—Submersible Pumps

Bulletin B259 describes the improved line of high capacity, low power submersible water supply pumps for 4 in. and larger wells. Pumps feature precision die cast bronze impellers and stages. Die casting produces super-smooth surfaces for maximum water flow. Sizes from 1/3 to 1 1/2 hp, capacities to 1760 gph.
Sumo Pumps, Inc.



495—Centrifugal Pumps

Bulletin 2131-B1 describes Worthington's 2 and 4-stage centrifugal pumps, types UNB and UNQ, pressures to 750 psi and capacities to 2500 gpm. This new multi-stage pump offers improved performance at big savings. Features are illustrated and described. Included are dimensions and specifications.
Worthington Corp.



496—Blowers, Gas and Vacuum Pumps

Series 400 and 600 rotary positive blowers, gas pumps, and vacuum pumps are described in bulletin S65C, including dimension drawings and cutaways. Volumes up to 20,000 cfm single stage with pressures to 10 psi or vacuums to 20 in. Hg. Features anti-friction bearings and wide-face herringbone timing gears.
Sutobilt Corp.



497—Power Plant Pumps

New bulletin BIP-58-8 covers a complete line of standard pumps for all power plant requirements from a 12,000 hp, double-case boiler feed pump, to condensate, circulating, and booster pumping duty. Also special pumps for nuclear power plant and other installations. A pump for every power plant need.
Byron Jackson Pumps, Inc.



498—Centrifugal Pumps

Bulletin B-2100 illustrates and describes the Peerless AquaLine horizontal centrifugal pump line. Immediately available, these compact, easily installed pumps are applicable to many jobs calling for hot and cold water handling, circulation, and boosting.
Peerless Pump Div.,
Food Machinery & Chemical Corp.



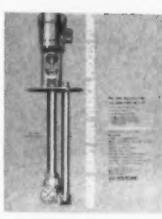
499—Vertical Compressor

Bulletin A-44 describes and illustrates Joy WGO-9 vertical oil-free compressor. Includes installation photographs, fully designated cross-section drawings, and a rundown on the compressor's features and essential parts with special section on T-Block design compression rings. Also data on other Joy oil-free units.
Joy Manufacturing Co.



500—Centrifugal Pumps

Bulletin 1004 describes the De Laval single stage, double suction, Type L, M, and P centrifugal pumps with capacities from 1000 to 20,000 gpm. Chart lists product features with construction data and advantages. Cutaway photograph with captioned arrows show construction and operation. Specifications are included.
De Laval Steam Turbine Co.



501—Process Pumps

Bulletin 727.1 gives detailed description of new line of vertical heavy-duty process pumps for both wet pit and dry pit installations. Capacities to 720 gpm; heads to 190 ft. For pit depths to 20 ft. Regularly supplied in 316 stainless steel combinations. Other materials to suit users' requirements.
Goulds Pumps, Inc.



502—Close-Coupled Pumps

New bulletin 975-F gives complete information relative to mechanical and hydraulic features of close-coupled pumps. Suitable for most pumping situations and especially desirable in limited space. Parts interchangeability permit low inventory. Application data included in bulletin. Rating tables simplify selection.
Buffalo Forge Co.



503—Centrifugal Pumps

New general catalog lists entire Dorr-Oliver pump line including alloy metal centrifugals, lined centrifugals, and air operated diaphragm pumps. Bulletins on each pump show line drawings, photographs, specification and performance data, and parts lists. All plastic bound into a single catalog.
Dorr-Oliver Inc.



504—Heavy-Duty Pumps

Bulletin SP-488 describes Viking heavy-duty pumps with new helical gear reducers. Speed ranges are 2.76 to 1, 3.4 to 1, 4.19 to 1, 5.06 to 1, and 6.27 to 1. These ranges permit changing of pump speeds to suit viscosity of material being pumped by substituting the proper gear reducer. Specifications, capacities, speeds.
Viking Pump Co.



505—Duplex Pumps

Bulletin 202 shows steam-driven, piston-packed duplex pumps by American-Marsh. For service requiring variable volume at constant pressure. Sectional view shows high construction quality. Performance and dimension charts describe 12 models with fluid end pressures to 250 psi, capacities from 9 to 232 gpm.
American-Marsh Pumps, Inc.



506—Vertical Turbine Pumps

Bulletin 11 describes Watermaster vertical turbine pumps. These pumps have the same precision engineering and high qualities that characterize high capacity pumps by Fiesse & Firstenberger. They cover a wide range of uses where the need is for relatively small capacities, from 15 gpm to 125 gpm.
Fiesse & Firstenberger Mfg., Inc.

**507—Manual Telephone Systems**

Bulletin 133A illustrates a variety of manual telephone systems from two station telephone systems to 200 line switchboard systems. Quick reference for choice of system to fill the varying communication needs in the school, office, factory, home, hospital, and hotel. Specifications given.

S. H. Couch Co., Inc.

**508—Economy School System**

Eight-page catalog illustrates a flexible, economical school system, combining sound, intercom, and time tone signals. This system can be easily expanded to provide console or rack panel equipment, interior fire, and emergency alarms without sacrificing original wiring, conduit, or classroom stations.

Executone Inc.

**509—"Dial-X" Telephone System**

Folder S-100R-2 shows how to banish seven common telephone annoyances with a Dial-X private telephone communication system. Switchboard equipment and four styles of telephones are illustrated and described for ten to seventy-four line systems. Dial-X system is unmatched for flexibility.

Stromberg-Carlson, Special Products Div.

**510—Clocks and Signals**

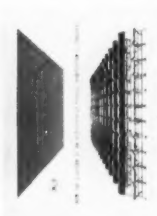
New engineers' and architects' catalog contains general descriptions, illustrations, specifications, and complete details on time and program systems (electronic, synchronous wired, Autoset impulse); clocks (secondary, synchronous, wall, double-faced, tower, special designs); signal equipment.

Stromberg Time Corp.

**511—Fire Alarm Systems**

Catalog illustrates and describes Standard's March Time, Master Code, and Box Code systems. Also covered are supplemental pre-signal circuits; non-code, continuous sounding bells and horns; code transmitters; control panels; stations; detectors; signals and accessories. Specifications included.

Standard Electric Time Co.

**512—Auditorium Acoustics**

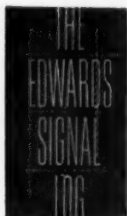
Brochure 3R 3528, "How the Illusion of a Perfect Auditorium is Created," describes the auditorium at David Sarnoff Research Center, Princeton, New Jersey. High fidelity loudspeakers, recessed microphones, and a progressive delay system create the illusion of sound coming from stage regardless of seating location.

Radio Corporation of America

**513—Nurses' Call System**

"Vokacall" brochure illustrates and describes complete audio-visual nurses' call system providing two-way communication between patient and nurse so sensitive that even a whisper is heard. The brochure outlines functioning of systems, with guide to specification writing and wiring diagrams.

Auth Electric Co., Inc.

**514—Signal Systems**

A pocket size resume of all Edwards products for industrial and commercial applications. It fully describes the advantages and convenience of modern signaling, covering the full range from large control, communications and protection systems to single components. Various products pictured.

Edwards Co., Inc.

**515—Programming Systems**

Bulletin 76-3483 illustrates in natural color and discusses in detail the design-features of Honeywell's master time and programming systems, which permit owners easily to set for themselves the programs they want. Reviews the field-organization behind "the clock that's backed by service."

Minneapolis-Honeywell Regulator Co.

**516—School Sound Systems**

Four-page brochure 7316-E-58 illustrates and describes a new and complete line of school sound distribution systems. It covers equipment suitable for the smallest to the largest school units. Building block flexibility of console styles, panels, and functions explained. Specification sheets furnished on request.

DuKane Corp.

**517—Hospital Communication**

Twelve-page color booklet illustrates and describes a large variety of individual hospital communication and sound systems, including audio-visual nurse call, doctors' paging, bedside radio-sound, and administrative intercom. Equipment, operating features, local planning, and service facilities available are discussed.

Executone Inc.

**518—Fire Alarm Systems**

Bulletin 131A explains, "What is a Couch local fire alarm system?" It tells how to select, from a complete line of systems, the modular fire alarm system for your institutional, commercial, or industrial building. Each of your system layouts include wiring diagrams, specifications, and a variety of optional features.

S. H. Couch Co., Inc.

**519—Communication Systems**

Catalog S-104R illustrates and describes 17 models from single channel to three channel systems. Both table top turrets and consoles with capacities from 22 to 180 rooms. Provisions included for telephone intercom, loudspeaker intercom, high fidelity FM-AM radio tuner, 3-speed transcription player.

Stromberg-Carlson, Special Products Div.

**520—Clock and Program Systems**

Bulletin CL-572 describes the centrally controlled clock and program systems for schools, institutions, public buildings, and industry. Included is description of various systems with illustrated wiring diagrams. Features and applications of are discussed. Various types of clocks and audible signals, with specifications.

Edwards Co., Inc.



521—Automatic Fire Detection

Bulletin 76-4521 discusses the fire-damage in buildings which costs a billion dollars a year and the need for automatic detection and alarm to check it. Dramatically points out the misconceptions behind four most common reasons owners give for not installing this unequalled protection.

Minneapolis-Honeywell Regulator Co.



522—Doctors' Register System

Brochure 22 describes the new "Dial-In" Doctors' In-and-Out Register System for large hospitals. The system permits inexpensive placement of registers at all doctors' entrances, eliminates space and wiring problems, reduces installation expense, and facilitates future expansion. For existing hospitals or new.

Auth Electric Co., Inc.



523—Sound Systems

Bulletin 3R-3490 discusses and defines sound systems. Monaural or Monophonic? Binaural or Stereophonic? A well-known expert in the field, Dr. Harry F. Olson, of RCA, clarifies the confusion in terminology regarding the basic types of sound reproducing systems by defining and describing characteristics.

Radio Corporation of America.



524—Time Recording Systems

"First Quality for Timing Accuracy" contains general description of electronic, synchronous wired, and Autoset impulse time and program systems with illustrations of the master time control, secondary clocks, and signals. Also illustrated and described briefly are attendance time recorders, job cost recorders.

Stromberg Time Corp.



525—Clock Catalog

Covers clock and program systems—two types include synchronous motor-powered secondary clocks, the other combining secondary clocks, minute-impulse type. Both have simplified programming, automatic resetting of secondary clocks. Bell control boards, various type signals, and clocks included.

Standard Electric Time Co.

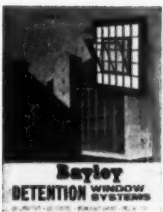


526—Communications Equipment

A new convenient wall chart of electronic and communications equipment symbols is offered consulting engineers. This time-saving guide is based on IRE, NEMA, and MIL standards and covers sound distribution, paging, private telephone, intercom, nurses' call, and MCS equipment symbols (17 x 22 in.).

DuKane Corp.

STRUCTURAL MATERIALS AND EQUIPMENT



527—Detention Window

Catalog D-59 describes the complete Bayley line of especially designed detention windows for penal and mental institutions. Shown are types suited to various degrees of detention and individual preferences as to fenestration and ventilation. Complete details of design, construction; specifications.

William Bayley Co.



528—Wire Reinforcement Study

New studies conducted by Armour Research Foundation agree with previous reports that the replacement of header courses by wire reinforcement *correctly designed* does not reduce the transverse strength of a wall. In fact there is an increase in strength of about 12 percent. Booklet contains illustrations of use.

AA Wire Products Co.



529—Spring Assisted Doors

Bulletin shows scale detailed drawings of horizontally hinged "spring assisted" doors. Complete line includes roof scuttles, smoke hatches, ceiling access doors, floor doors, pit doors, sidewalk doors, and basement doors with steel stair stringers. Specifications outlined, standard sizes, and weights.

Bilco Co.



530—Scaffold Shoring

Bulletin BP-10 describing Beatty scaffold shoring is composed of 6 pages and printed in 2 colors. Contains diagrams, shoring data tables, and description of frames. Wing-nuts and studs are replaced with labor-saving patented Snaplocks. Various applications are pictured. Also described is Pecco shoring.

Beatty Scaffold, Inc.



531—Waterstops

Four-page bulletin WS-59 covering complete line of rubber, vinyl, and neoprene waterstops with molded accessories such as unions, tees, and crosses—both flat and vertical. Includes properties and characteristics, recommendations for use, methods of installing in formwork, and suggested specifications.

Williams Equipment & Supply Co.



532—Concrete-Filled Columns

Concrete-Filled Columns: complete illustrated literature on pipe columns, square and rectangular tube columns, including safe loads, physical properties, and sample computations. Most fire-resistant, nonfire-proof column made, your key to better, safer construction. Types of columns and connections shown.

Tubular Products, Inc.



533—All-Steel Buildings

New 'erect-it-yourself' all-steel buildings, called the Stran-Master, are described in illustrated catalog. Ideal for low-cost warehousing, light manufacturing, retail stores, general utility, the Stran-Master can be erected by an unskilled crew in 180-200 man-hours. Adjustable telescoping columns and girts.

Stran-Steel Corp.



534—Steel Rope

This publication contains information required for selection and preparation of specifications for wire, strand, and rope used on guyed structures and suspended systems of all kinds, except major suspension bridges. Both standard and special fittings for use with bridge strand and bridge rope are illustrated.

John A. Roebling's Sons Corp.



535—Precast Concrete Slabs

Bulletin X-541 gives complete information on Permacrete precast concrete crossing slabs. These edge-armored slabs provide smooth riding surfaces with greater safety and eliminate constant maintenance of railroad grade crossings. Widely used on crossings throughout industrial plant properties.

Permacrete Products Co.



536—"Marzaic" and Broomed Panels

This new 8-page full color catalog showing samples of Marietta Marzaic and broomed finish surfaces is now available. The catalog includes photographs, construction details, and specifications on Marzaic and broomed panels as well as other pertinent facts on the many company services.

Marietta Concrete Corp.



537—Gypsum Roof Decks

Technical bulletin 589 gives description of materials and methods, plus specifications used in the construction of poured gypsum roof decks. Contains tables for selecting steel framing members. Describes wide variety of formboards for conditions requiring insulation and acoustical treatment. Twelve pages.

National Gypsum Co.



538—"Safe-Gard" Metal Partitions

New catalog describes Globe Safe-Gard expanded metal partitioning with exclusive Quick-Erect patented fittings for easy method of guarding conveyors and machines and for all in-plant partitions. Catalog shows method of erection of prefabricated panels, full range of sizes available, and complete engineering data.

Globe Co.



539—Steel Roof Decking

Catalog D-591, revision of D-581, describes new Granco steel roof deck — greater strength, easier to erect, and flint-hard enamel finish. Shows section properties, load tables, typical details, standard accessories, installation information, and suggested specification. Contains photographs and details.

Granco Steel Products Co.



540—Metal Buildings

Bulletin BD-159 shows various applications of the standard pre-engineered Parkersburg metal buildings. Featured are commercial front treatments to meet individual tastes and individual needs without sacrificing the metal building economy. Parkersburg offers buildings to meet every requirement.

Parkersburg Rig and Reel Co.



541—Flooring and Grating

This 20-page bulletin describes the wide line of Hendrick's Mitco open steel flooring, aluminum grating, Shur-Site treads, Armogrids, and driveway grating. Fully illustrated with actual installations in a wide range and variety of industries. Complete with sizes, specifications, capacities, applications, safe loading data.

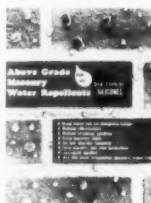
Hendrick Manufacturing Co.



542—Floor Gratings

Bulletin covers an improved conception for the installation of floor gratings, using the single-span divider-bar, combined with Borden's type K reversible grating. Simplifies maintenance as well as installation. Bulletin pictures and describes installation at the new Public Service Generating Station, Linden, N. J.

Borden Metal Products Co.



543—Silicone Water Repellents

Original appearance of masonry surfaces is retained when protected by Dow Corning silicone masonry water repellents. Bulletin 8-301 explains how silicone treatments reduce efflorescence by keeping water out, yet allow brick, block, and concrete surfaces to "breathe". Adds life to this type of structure.

Dow Corning Corp.



544—Steel Sheet Piling

Booklet 17954-56 describes the uses, characteristics, and assembly of USS steel sheet piling sections. Complete tables of wall dimensions, cellular structures, accessories, and weights. Included are diagrams of single sections, walls, corners, cellular structures, cofferdams, bulkheads and piers, and caps and copings.

U. S. Steel Corp.



545—Plaster Aggregate

Bulletin P11-1959 contains plastering specifications and fireproofing data for Permalite plaster aggregate. Describes the characteristics of Permalite expanded perlite, its many advantages, and the results of its use as a lightweight fireproofing on ceilings, walls and partitions, and columns and beams.

Great Lakes Carbon Corp.



546—"Pozzolith"

Durable concrete for water and sewage treatment plants is the subject of this booklet. Shows 35 installations with case history data on concrete under actual operating conditions. Discussion includes factors to be considered for proportioning of concrete for severe exposure and it is improved with Pozzolith.

Master Builders Co.



547—Steel Curtain Wall

Booklet 57791, entitled "Walls of Steel," fully discusses the selection, fabrication, and erection of steel curtain wall for many recent commercial and industrial buildings. The book is illustrated in full color and describes the use of steel panels as spandrels, column covers, and mullions. Practical and economical.
U. S. Steel Corp.



548—Steel Joists

Catalog E-290 describes Republic Steel's Truscon cold formed O-T steel joists. These joists provide a more rigid, fire resistant, economical, and lightweight floor construction. Included are dimensions and sections, load and spacing tables, standard specifications, and construction details. Types of joists illustrated.
Republic Steel Corp.



549—Smokestacks

Bulletin SS-202A describes Permaglas smokestacks, protected against corrosive flue gases. Features include longer life, low maintenance, lightweight, and easy installation. Chart shows how Permaglas stacks cost less over a period of years. Special Permaglas sections, smokestack accessories, and typical installations.
A. O. Smith Corp.



550—Structural Bolts

Catalog describes Lamson high strength bolts for buildings, bridges, towers, and other applications, that give maximum holding power. Bolting principles, ordering data, prices are included. Bolt is distributed by 20 U. S. Steel Supply Division Steel Service Centers in key locations throughout the country.
Lamson & Sessions Co.



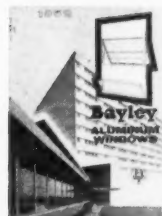
551—Safety Metal Grating

Catalog 5911 describes Globe's safety Grip-Strut grating and Globe's new Gold Nugget welded grating, the projection welded grating for greater rigidity and strength. Features and advantages of both types of grating fully described and illustrated with load charts for each type explained.
Globe Co.



552—Access Doors

Catalog describes horizontally hinged "spring assisted" access doors. Complete line includes, roof scuttles, smoke hatches, ceiling access doors, flush floor doors, sidewalk doors, basement doors. Specification outlines, materials, prices, weights, sales offices listed. Completely illustrated with photos and drawings.
Bilco Co.



553—Aluminum Windows

Catalog A-59 describes the complete line of Bayley aluminum windows, including original Bayley features. The booklet includes such items as projected windows, pivoted windows, class room windows, ribbons windows, and detention windows. Dimensions, construction, design, fasteners, materials, and finish.
William Bayley Co.



554—Steel Base for Floors

Catalog BFG-594, revision of BFG-584, describes Corruform and Tufcor, high strength permanent steel base for concrete floors and roof slabs in new patterns and sheet lengths. Photos show installations and installation procedures. Shows section properties, load tables, accessories, and suggested specification.
Granco Steel Products Co.



555—Rolling Counter Shutters

Bulletin 103 describes the Kinnear rolling counter shutters with midget slats. These metal shutters afford protection against weather, pilfering, or illegal entry. End photographs show construction of slats. Diagrams show dimensions for both crank and push-up operation. Includes specifications and special features.
Kinnear Manufacturing Co.



556—Steel Doors

Hand operated, mechanically operated, and power operated Underwriters' labeled and non-labeled rolling steel doors, grilles, and shutters to meet every door requirement are described and illustrated in 16-page catalog C59. Complete specifications are given for each type with drawings, dimensions.
R. C. Mahon Co.



557—Roof Coatings

Bulletin describes Dry-N-Tite liquid, plastic, aluminum, and primer roof coatings for patching, resurfacing, and coating build-up composition on corrugated or sheet metal, slag, gravel, concrete, and felt roofs. Roofs can be patched when damp or wet.
*A. C. Horn Companies,
Division of Sun Chemical Corp.*



558—Steel Stair Treads

Tread-Grip steel stair treads combine strength of construction with safe, non-slip footing, according to four-page bulletin HTP2130. This brochure describes such features as A. W. Algrip nosing, electroforged and welded construction, and twisted cross bars. Included are detail drawings and dimensions.
Horace T. Potts Co.



559—Asbestos-Cement Roofing, Siding

Full-color catalog illustrates K. M. non-corroding, nonrotting asbestos-cement roofing shingles; fluted and ribbed decorative panels; Apac, Linabestos, and Sheelflexto wallboard; corrugated asbestos roofing and siding; building-sewer pipe. Durability, attractive colors, fire-safety of asbestos-cement are stressed.
Keasbey & Mattison Co.



560—Flooring, Grating, Treads

General grating catalog F-400 contains illustrations, descriptions, and complete engineering data on grating flooring, treads, and floor armoring (riveted, press-locked, and welded types). Irving grating is safe, durable, fireproof, ventilating, clean, and economical for industrial and power plant flooring and stairways.
Irving Subway Grating Co., Inc.



561—Concrete Tensioning Materials

Catalog PC-936 shows sizes, weights, strengths, and typical load-elongation curve of uncoated stress-relieved strand for pretensioned bonded prestressed concrete. Properties of galvanized strand and uncoated stress-relieved wire for post-tensioned design are listed. End fittings, bearing plates are illustrated.

John A. Roebling's Sons Corp.



562—Horizontal Shoring

New 3-color bulletin shows Beatty-Pecco horizontal shoring used on variety of jobs. Shows cost saving advantages, sizes available, and gives permissible spans for slabs from 44 to 187 lbs/sq ft. Explains how simple wedge lock works and gives advantages over conventional falsework used in erection of structures.

Beatty Scaffold, Inc.



563—Steel Joists

This 40-page steel joist catalog contains complete design information for spans up to 120 ft. It covers in detail design calculations, bridging, end details, and accessories. Complete tables of properties and dimensions, standard loading, and design load.

American Bridge Division
U. S. Steel Corp.



564—Sectional Concrete Buildings

Catalog describes the line of sectional concrete buildings made in 6, 8 and 12 ft. widths, and lengths in increments of 2 ft. Shipped knocked down with precast floors, roofs, hardware, and joint sealing materials for easy field assembly. Fire-proof storage, microwave, and mechanical equipment housing.

Permacrete Products Corp.



565—Concrete Quality Control

Twelve reports of concrete quality control achieved during construction of major tunnel projects in the western hemisphere. Discusses the concreting problems encountered in highway, railway, and water tunnel work and describes the role of Pozzolite in achieving uniform, quality concrete under varying conditions.

Master Builders Co.



566—Large Doors

Sixteen-page catalog describes the types of doors manufactured and installed for industrial building and aircraft hangar installations. Included are canopy type, motorized slide, turn-over, and vertical lift doors. Doors such as for crane entrances and the "Byrna-perture" for hangars are also described and illustrated.

Byrne Doors, Inc.



567—Wire Rope Catalog

A complete basic catalog for selecting wire rope for any use. Cross sections of different types of rope show construction. Rope diameters, breaking strength, and weight are given for all classifications. Well illustrated showing different uses. Wire rope fittings are illustrated.

American Steel & Wire Division
U. S. Steel Corp.



568—Bearing Bolts

Engineering, ordering data on new Lamson high strength bearing bolts for buildings, bridges, towers, and other applications. Bolt has highest shear strength, greatest resistance to slip of all structural bolts. Distributed by 20 U. S. Steel Supply Division Steel Service Centers throughout the country.

Lamson & Sessions Co.



569—Concrete Insulation

New bulletin C11-1959 describes Permalite insulating concrete for roof decks and floor fills. Specifications for mixing and application are given. General characteristics of Permalite concrete are also discussed. Engineering data, which includes safe uniform loads and physical properties, on roof deck systems.

Great Lakes Carbon Corp.



570—Perforated Metals, Screens

This 136-page general catalog describes the complete line of Hendrick perforated metals, screens, and fabricated metals in full detail. Includes complete specifications for round, diamond, square, and slot perforated metals together with full size illustrations of each. Contains ordering information and computation tables.

Hendrick Manufacturing Co.



571—Corrugated Roofing, Siding

New manual 2785 depicts and explains all accepted methods of applying corrugated Asbestone "400." Gives instructions on storage, handling, accessories, sealing compounds, plus detail drawings. Gold Bond corrugated Asbestone "400" resists rot, fire, salt air, corrosion. Also has many interior uses. A.I.A. File No. 12-F.

National Gypsum Co.



572—Exterior Wall Panels

Handy four-page catalog 243, 1959 edition, describes field-assembled, non-load-bearing exterior wall panels for siding and insulated walls. This bulletin includes sections, recommended girt spacing, typical construction details, and suggested engineering specifications. Shows diagrams and photographs.

Inland Steel Products Co.



573—Service Fittings

Bulletin 493 illustrates design features, simplicity of assembly of new Spang service fittings, suitable for use with under-floor distribution systems of any manufacturer. Covers individual power and phone fittings and includes illustrations of linoleum pan, terrazzo holder, plus part numbers, and ordering information.

National Supply Co.



574—Steel Buildings

Catalog SX-2058 describes what the Armco building method is and what it means to engineers and builders. Covers a complete line of steel buildings. Table of sizes given and typical installations shown in full color. Section on building accessories and condensed specifications is included.

Armco Drainage & Metal Products, Inc.



575—Rigid Frame Buildings

New 20-page booklet describes Stran-Steel Corporation's complete line of rigid frame buildings with the luxury look of Stran Satin for industrial and commercial use. Building features, construction details, and dimensions are clearly shown. For manufacturing and processing plants, warehousing, and retail operations.

Stran-Steel Corp.



576—Aluminum Grating

Eight-page bulletin on aluminum grating. Various types of gratings are illustrated. Included are detailed drawings and tables of safe loads for Roll-Lock multipurpose aluminum grating, pressure-lock aluminum grating, and riveted aluminum grating. Also included are details on aluminum stair treads.

Kerrigan Iron Works, Inc.



577—Steel Design Manual

First complete published manual containing design instruction for use of high strength steels. Includes fundamental characteristics, design considerations, working unit stresses, tension, compression, shear, deformation and deflection, formed sections, and design against corrosion. Engineering, not sales manual.

U. S. Steel Corp.



578—Masonry Reinforcement

All new 1959 Sweet's brochure now available. AA Wire Products Company, manufacturers of masonry reinforcement and masonry ties, announce that the all new 1959 Sweet's brochure is now available. The new brochure features design drawings, photographs of installations, and suggested guide specifications.

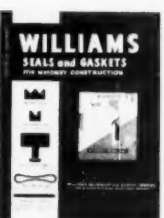
AA Wire Products Co.



579—Floor Hardeners

A new 4-page catalog describing in detail eight products for patching, topping, and resurfacing concrete or wooden floors. A detailed description of each is included. Also included is a page on "How to Resurface Your Floors with Nu-Way Resurfacer."

A. C. Horn Companies,
Division of Sun Chemical Corp.



580—Seals and Gaskets

Four-page bulletin SG-659 covering complete line of Weatherite seals for various types of control joints in block constructed walls. It also covers masonry gaskets of nonabsorbent elastomer for use between sill and coping stones, brick or stone wall panels, and masonry and structural steel members.

Williams Equipment & Supply Co.



581—Sub-Flooring Panels

Catalog 270 describes Cellulor, the new panel which serves as both structural sub-floor and cellular raceway for in-floor electrification, communication, or heating systems. Includes load tables, section properties, construction and installation details, and specifications. Typical applications pictured.

Inland Steel Products Co.



582—Masonry Wall Reinforcement

This four-page bulletin is printed in two colors and describes Dur-O-wal masonry wall reinforcement. Included are features, advantages, physical properties, and general specifications. Information on cavity wall construction, rod deformation, bonding, and report of tests are also contained in this bulletin.

Dur-O-wal.



583—Aluminum Grating, Treads

New four-page folder describes Gary Super Galok aluminum grating and treads which can be used for decorative as well as for utility purposes and can be anodized in sunfast colors. Folder includes tables of safe loads, weights and symbols, panel widths. Specifications are also included.

Rockwell-Standard Corp., Grating Div.



584—Metal Buildings

General catalog BD-958 describes the Parkersburg line of versatile metal buildings. Features include weather-tightness, rigidity, and flexibility. Designed with future expansion in mind. These features combine economy and quality. All types of buildings are shown from total sheds to factories. Accessories, details.

Parkersburg Rig and Reel Co.



585—Rolling Doors

Bulletin 101, 36 pages, is a complete catalog of the many types of doors made by Kinnear. It gives information on the types of operations, both manual and electrical; elevation drawings; mounting methods for various applications and locations; specifications; and explains special construction features of these doors.

Kinnear Manufacturing Co.



586—Grating Catalog

This 16-page catalog shows the three basic types of grating construction; gives more than 30 dimensional drawings of subtypes; eight safe load tables covering steel and aluminum grating, roadway grating, and sidewalk slabs; tables on panel widths, tread widths, and floor armor. Planning layouts are given.

Borden Metal Products Co.



587—"T-1" Steel Data

Booklet 607-56 describes USS "T-1" steel, one of the most important members of the alloy family to appear on the scene in years. Contains cost comparisons, complete engineering data, metallurgical characteristics, fabrication practices, and applications. Profusely illustrated to show uses. Cuts costs, increases performance.

U. S. Steel Corp.



588—Duct Systems

Bulletin 491 presents descriptions, drawings, part nos., and photos of the three Spang duct systems for power, phone, and intercom: Underfloor duct (for regular slab construction), headerduct (for cellular floors), and industrial duct (large capacity for heavy requirements in phone and intercom systems).

National Supply Co.



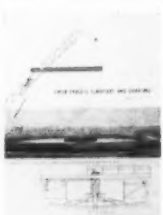
589—Sewage Lift Stations

This 100-page manual on factory-built sewage lift stations contains bulletins, selection charts, diagrams, installation data, and specifications for pump-type or pneumatic ejector lift stations. Detail bulletin on new "Non-Clog" sewage pumps and list of more than 1000 S&L stations in operation across the nation. *Smith & Loveless, Inc.*



590—Water Supply

Ranney's revised 24-page booklet entitled "Supplying Water" describes the unique Ranney methods of supplying more clear water to industry and municipalities. Valuable information is included on horizontal collectors, Vertube wells, Ranney intakes, and Ranney's new dewatering process. *Ranney Method Water Supplies, Inc.*



591—Clarifier and Oxidator

Bulletin SM-1005 covers line of clarifier and oxidator mechanisms for water, sewage, and industrial waste treatment. Described are basic types that cover a full range of tank sizes and load requirements, and special units for unusual conditions. *Process Engineers, Inc.*

Division of Einco Corp.



592—High-Flow-Rate Clarifier

Bulletin CL-158 describes the Ilco-Way continuous high-flow-rate clarifier, an upflow coagulator design that is adaptable to a wide variety of water and waste treatment applications, including lime-soda dealkalization, removal of iron, color, turbidity, organics, silica, and chemical waste treatment. *Illinois Water Treatment Co.*



593—Water Conditioning

Sixty-page manual Z-5 explains ion exchange water conditioning processes, the resins and equipment used, quality of water produced, and typical costs involved. Designed as a practical handbook to aid engineers in proper selection and operation of ion exchange units in water conditioning applications. *National Aluminate Corp.*



594—Swimming Pool Filtration

Catalog 803, 32 pages, describes equipment specially designed for municipal, club, school, and commercial swimming pools of moderate to large size. Gives data on everything for the pool including inlet and drain fittings, filtration, recirculation, chlorination, lighting, cleaning, diving equipment, and accessories. *Elgin Softener Corp.*



595—Filters for Pools

Bulletin 169 describes latest filter for pools to 40,000 gals capacity — the new Hopkins "Filtermaster" Model GL with corrosion-free glass-lined tank, precipitate baffle, and tank seal to prevent filter powder carryover to pool, and either controlled backwash or manual filter cleaning. Three sizes displayed. *Hopkins Equipment Co.*



596—Diatomite Water Filter

Bulletin 780 describes a new diatomite water filter for swimming pools in clubs, schools, and public pools. Furnished for either salt or fresh water. Contains engineering specifications and operating information. Single unit capacities up to 1,100,000 gallons on a 3 gpm per sq ft rate based on a 6 hr turnover. *Sparkler Manufacturing Co.*



597—Diatomite Pressure Filters

Bulletin 2-323 covers the line of Bruner diatomite pressure filters for swimming pools. Standard filters are available in sizes from 12 to 672 sq ft. Features include a septum with interlocking plastic disc core and plastic cloth sleeve. Schematic diagrams and comparison charts for diatomite and sand filters. *Bruner Corp.*

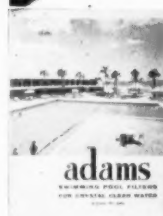


598—Water Demineralization

Bulletin WC-111, a completely revised and enlarged edition, deals with the complete subject of demineralization of water. The bulletin is complete with charts indicating the types of units and the advantages and applications of each. Cost-estimating curves and details of equipment are included. *Graver Water Conditioning Co.*

599—Surface Water Filters

Bulletin 5811 describes the five basic Contralto designs used for treatment of well and surface waters, and for neutralization, recovery, and separation of waste products. Pictures, drawings, and tables show standard units up to 70 feet in diameter. Specifications and data for larger units are available. *General Filter Co.*



600—Swimming Pool Filters

New 24-page technical bulletin for architects and consulting engineers on swimming pool filters for municipal, public, and institutional pools. Contains typical installations, cross-section and operational drawings, charts, and factual comparison. This manufacturer does not offer a filter for backyard type pools. *R. P. Adams Co., Inc.*



601—Water Stills

Catalog "H" describes Barnstead's complete line of water stills specially designed for hospital use. In capacities of from 1/2 gallon to 1000 gallons per hour and operated by steam, electricity, gas, and kerosene. Other models for double and triple distillation are also described in this useful catalog. *Barnstead Still & Sterilizer Co.*



602—Reactors

Publication 5001-C describes the operation of solids-contact reactors and important considerations in their design. Complete descriptions of Cochrane's radial horizontal flow units are given, including round and square designs in steel and concrete. Notes on auxiliary equipment and chemical feeds are included. *Cochrane Corp.*



603—"Hydro-Treator"

Bulletin 9041 describes Dorco Hydro-Treator, a self-contained, high-rate water treatment unit for the removal of hardness, turbidity, color and algae from municipal and industrial water supplies. Includes description of unit, sizes, capacity ratings, and the chemical dosing requirements.

Dorr-Oliver Inc.



604—Chlorinators

This 16-page pocket size booklet describes Wallace & Tiernan's new V-notch chlorinators. It explains what they are, how they work, and the type of automatic control possible with this chlorinator. The booklet also shows the full line of chlorinators and lists chlorinator capacities. Major features illustrated.

Wallace & Tiernan Inc.



605—Swimming Pool Filters

Catalog 356 gives valuable information to swimming pool owners and operators on the Hopkins line of "Filtermaster" stationary and portable units. Explains how clean, clear water at high flow rates is obtained for large and small pools with these filters, using efficient, low cost diatomaceous earth principle of filtration.

Hopkins Equipment Co.



606—Sewage Treatment Plant

This data manual on the S&L "Oxigest" sewage treatment plant contains notes on design, engineering data, specifications, and installation instructions plus lists of accessory equipment. Now 27 standard sizes; factory-built units for small subdivisions, schools, motels, factories in need of dependable sewage treatment.

Smith & Loveless, Inc.



607—Flotation Systems

Flotators and auxiliary equipment are described in bulletin SM-1003. Flotation systems covered are designed to accomplish difficult liquid-solids separations in treatment of industrial wastes and domestic sewage. Illustrated with flow-sheets, schematics, and photographs.

Process Engineers, Inc.

Division of Eimco Corp.



608—Water Treatment Equipment

Bulletin E describes the automation of ion-exchange and water treatment equipment. A suggested specification is included, together with typical illustrations and descriptions of important design features. Automatic control systems described are adaptable to any automatic valve sequencing operation.

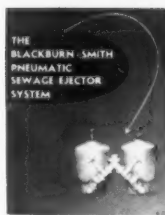
Illinois Water Treatment Co.



609—Supplying Water

Twenty-four page booklet entitled "Supplying Water" describes the unique Ranney methods of supplying more clear water to industry and municipalities. Valuable information is included on horizontal collectors, infiltration galleries, Vertube wells, Ranney intakes, and new dewatering process.

Ranney Method Water Supplies, Inc.



610—Pneumatic Sewage Ejector

Municipal pump and lift stations will give uninterrupted service when equipped with B-S pneumatic sewage ejectors. Available in capacities of 30 to 500 gpm for discharge heads up to 150 ft, these single and twin units eliminate complex piping, screens, shredders, and impellers. Catalog S-55 fully describes them.

Condenser Service & Engrg. Co., Inc.



611—Water Treatment

Bulletin 615, a 24-page guide to water treating, describes manual and automatic zeolite water softeners, mixed-bed and multi-column deionizers, dealkalizers, ion exchangers, filters, purifiers, aerators and degasitors. Also covers spray and tray type deaerating heaters and water treating chemicals for every need.

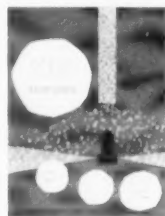
Elgin Softener Corp.



612—Diatomite Water Filter

Bulletin 670 describes a new type heavy duty diatomite water filter for plant supply water or for filtration of re-use of water without appreciable heat loss. Complete description of diatomite filtration, including engineering specifications. Also gives flow rate charts and table of capacities.

Sparkler Manufacturing Co.



613—Feedwater Deaeration

New 12-page bulletin 575-A, fully illustrated, presents a fresh approach — a major advance in boiler feedwater deaeration. Completely different and inherently better design concept assures complete deaeration down to .005 cc/liter under all normal load variations, with excellent thermal efficiency.

Fred H. Schaub Engineering Co.



614—Zeolite Water Softeners

Bulletin Z-1 is a 4-page pamphlet describing the treatment of boiler feedwater using Nalcite HCR cation exchanger in a hot line zeolite system. Included are two schematic diagrams of such a system and a table showing the quality of effluent waters obtainable from raw waters of various composition.

National Aluminate Corp.



615—Zeolite Water Softeners

Engineers will be interested in this new 12-page softener bulletin and will want one for their own use. It is well illustrated and contains data and capacities of softening equipment. Bulletin features "CR" Zeolite softeners. Free on request. Bulletin is completely illustrated throughout. Bulletin No. 5783.

General Filter Co.



616—Evaporators

A 24-page booklet describes Maxim evaporators: steam, heat recovery, flash, steam jet compression, and vapor compression. Tells about Maxim's marine test station for pre-testing and R & D under marine conditions. Describes typical power-water plant, high purity make-up feed water, gives engineering data.

Emhart Mfg. Co., Maxim Division

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